General Relativity

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1 Introduction

2 The field euations of general relativity

2.1 Full R_{ij}

$$
\begin{aligned}
R_{00} \;=\;& -\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0} + g^{11}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1} - \frac{1}{2}g^{11}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1} - g^{12}\frac{\partial^2 g_{12}}{\partial x^0\partial x^0} \\
& + g^{12}\frac{\partial^2 g_{02}}{\partial x^0\partial x^1} + g^{12}\frac{\partial^2 g_{01}}{\partial x^0\partial x^2} - g^{12}\frac{\partial^2 g_{00}}{\partial x^1\partial x^2} - g^{13}\frac{\partial^2 g_{13}}{\partial x^0\partial x^0} \\
& + g^{13}\frac{\partial^2 g_{01}}{\partial x^0\partial x^3} - g^{13}\frac{\partial^2 g_{00}}{\partial x^1\partial x^3} - \frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0} + g^{22}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2} \\
& - \frac{1}{2}g^{22}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2} - g^{23}\frac{\partial^2 g_{23}}{\partial x^0\partial x^0} + g^{23}\frac{\partial^2 g_{03}}{\partial x^0\partial x^2} + g^{23}\frac{\partial^2 g_{02}}{\partial x^0\partial x^3} \\
& - g^{23}\frac{\partial^2 g_{00}}{\partial x^2\partial x^3} - \frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0} + g^{33}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3} - \frac{1}{2}g^{33}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3} \\
& + \frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0} - \frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1} + \frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0} - \frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1} \\
& - \frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2} + \frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2} - \frac{1}{4}g^{01}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1} + \frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0} \\
& - g^{01}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1} + \frac{1}{4}g^{01}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^0} + \frac{1}{2}g^{01}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^1} + \frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0} \\
& - \frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1} - \frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3} + \frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3} + \frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0} \\
& - \frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2} + g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3} - g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3} - \frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2} \\
& + g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0} - g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1} - g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2} + g^{01}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2} \\
& + \frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2} - \frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1} + \frac{1}{4}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2} + g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2} \\
& - g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2} + \frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0} + \frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1} - \frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2} \\
& + \frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0} - g^{02}g^{11}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1} - \frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2} + \frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2} \\
& + \frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0} - \frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2} - \frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3} + \frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3} \\
& - \frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3} + g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0} - g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1} - g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3} \\
& + g^{01}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3} + g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3} - \frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3} + \frac{1}{4}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1} \\
& - \frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2} + \frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0} - g^{01}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2} - \frac{1}{4}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0} \\
& + \frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2} + g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1} - g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1} + \frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^0}
\end{aligned}
$$

$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}+g^{02}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-g^{02}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+g^{02}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}$$
$$-g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-3g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}$$
$$+g^{02}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}$$
$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^0}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}$$
$$-g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^0}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-g^{11}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+g^{11}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}$$
$$+g^{11}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-g^{11}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$+g^{01}g^{23}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-g^{01}g^{23}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-g^{01}g^{23}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-g^{02}g^{13}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}$$
$$-g^{02}g^{13}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$+g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}$$
$$+g^{02}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-g^{02}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}-g^{11}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+g^{11}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}$$
$$+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{11}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}$$
$$-g^{11}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$-g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$+g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$+g^{03}g^{12}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-g^{03}g^{12}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-g^{03}g^{12}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}$$

$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{01}g^{33}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}$$
$$-g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}$$
$$-g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}$$
$$+g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}+g^{11}g^{23}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-g^{11}g^{23}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-g^{11}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-g^{11}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}$$
$$+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+g^{11}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+g^{11}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-g^{11}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}$$
$$-g^{11}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}+g^{11}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}$$
$$-g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+g^{03}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$-g^{03}g^{22}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^2}-2g^{12}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$+g^{12}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{12}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+g^{12}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-g^{12}g^{13}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}$$
$$+g^{12}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-g^{12}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}$$
$$+g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}$$
$$+g^{12}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-g^{12}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}$$
$$+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{12}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}$$
$$+g^{12}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{02}g^{33}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-g^{11}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}$$
$$-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-2g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}$$
$$+g^{03}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}-g^{12}g^{23}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-2g^{12}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{12}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-g^{12}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-g^{12}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}$$
$$+g^{12}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+g^{12}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-g^{12}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}$$

$$+g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+g^{12}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-g^{13}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-g^{13}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$+g^{13}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{13}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{13}g^{22}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+g^{13}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}$$
$$-g^{13}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{13}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{13}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-g^{13}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+g^{03}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-g^{03}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{12}g^{33}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-g^{12}g^{33}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-g^{12}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{12}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+g^{12}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+g^{12}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+g^{12}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-g^{12}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-g^{12}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+g^{12}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}-g^{13}g^{23}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$-g^{13}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+g^{13}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{13}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-2g^{13}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{13}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{13}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}$$
$$+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{13}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{13}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$+g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}-g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}+g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}-g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}$$
$$-g^{22}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}$$
$$-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+g^{22}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}$$
$$+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-g^{13}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+g^{13}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{13}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}-g^{13}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{22}g^{33}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-g^{22}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{23}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+g^{23}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{00}}{\partial x^1}\right)^2$$
$$+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{00}}{\partial x^2}\right)^2+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{00}}{\partial x^3}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2$$
$$+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2$$
$$+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{00}}{\partial x^1}$$

$$
\begin{aligned}
&-\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{00}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\left(g^{12}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\left(g^{12}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}\\
&+\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\left(g^{12}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\left(g^{13}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\left(g^{13}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\left(g^{13}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}\\
&-\left(g^{23}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\left(g^{23}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&+\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&+\left(g^{23}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^0}\right)^2\\
&+\frac{1}{2}\left(g^{12}\right)^2\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{1}{2}\left(g^{12}\right)^2\left(\frac{\partial g_{02}}{\partial x^1}\right)^2-\frac{1}{2}\left(g^{12}\right)^2\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{2}\left(g^{13}\right)^2\left(\frac{\partial g_{13}}{\partial x^0}\right)^2\\
&-\frac{1}{2}\left(g^{13}\right)^2\left(\frac{\partial g_{03}}{\partial x^1}\right)^2-\frac{1}{2}\left(g^{13}\right)^2\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^0}\right)^2+\frac{1}{2}\left(g^{23}\right)^2\left(\frac{\partial g_{23}}{\partial x^0}\right)^2\\
&-\frac{1}{2}\left(g^{23}\right)^2\left(\frac{\partial g_{03}}{\partial x^2}\right)^2-\frac{1}{2}\left(g^{23}\right)^2\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^0}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{01} \quad = \quad &+\frac{1}{2}g^{01}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}-g^{01}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}+\frac{1}{2}g^{01}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}+\frac{1}{2}g^{02}\frac{\partial^2 g_{12}}{\partial x^0\partial x^0}\\
&-\frac{1}{2}g^{02}\frac{\partial^2 g_{02}}{\partial x^0\partial x^1}-\frac{1}{2}g^{02}\frac{\partial^2 g_{01}}{\partial x^0\partial x^2}+\frac{1}{2}g^{02}\frac{\partial^2 g_{00}}{\partial x^1\partial x^2}+\frac{1}{2}g^{03}\frac{\partial^2 g_{13}}{\partial x^0\partial x^0}\\
&-\frac{1}{2}g^{03}\frac{\partial^2 g_{03}}{\partial x^0\partial x^1}-\frac{1}{2}g^{03}\frac{\partial^2 g_{01}}{\partial x^0\partial x^3}+\frac{1}{2}g^{03}\frac{\partial^2 g_{00}}{\partial x^1\partial x^3}-\frac{1}{2}g^{12}\frac{\partial^2 g_{12}}{\partial x^0\partial x^1}\\
&+\frac{1}{2}g^{12}\frac{\partial^2 g_{11}}{\partial x^0\partial x^2}+\frac{1}{2}g^{12}\frac{\partial^2 g_{02}}{\partial x^1\partial x^1}-\frac{1}{2}g^{12}\frac{\partial^2 g_{01}}{\partial x^1\partial x^2}-\frac{1}{2}g^{13}\frac{\partial^2 g_{13}}{\partial x^0\partial x^1}\\
&+\frac{1}{2}g^{13}\frac{\partial^2 g_{11}}{\partial x^0\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{03}}{\partial x^1\partial x^1}-\frac{1}{2}g^{13}\frac{\partial^2 g_{01}}{\partial x^1\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^1}\\
&+\frac{1}{2}g^{22}\frac{\partial^2 g_{12}}{\partial x^0\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{02}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{01}}{\partial x^2\partial x^2}-g^{23}\frac{\partial^2 g_{23}}{\partial x^0\partial x^1}\\
&+\frac{1}{2}g^{23}\frac{\partial^2 g_{13}}{\partial x^0\partial x^2}+\frac{1}{2}g^{23}\frac{\partial^2 g_{12}}{\partial x^0\partial x^3}+g^{23}\frac{\partial^2 g_{03}}{\partial x^1\partial x^2}-\frac{1}{2}g^{23}\frac{\partial^2 g_{03}}{\partial x^1\partial x^2}\\
&+\frac{1}{2}g^{23}\frac{\partial^2 g_{02}}{\partial x^1\partial x^3}-g^{23}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^1}+\frac{1}{2}g^{33}\frac{\partial^2 g_{13}}{\partial x^0\partial x^3}\\
&+\frac{1}{2}g^{33}\frac{\partial^2 g_{03}}{\partial x^1\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{01}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}\\
&-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+g^{00}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}\\
&-\frac{5}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}\\
&+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}+g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}
\end{aligned}
$$

$$+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}$$
$$-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}+g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}$$
$$+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^0}+g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}$$
$$+g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}$$
$$+g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+g^{02}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{3}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{02}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-g^{02}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}$$
$$+g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}$$
$$-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}$$
$$+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^0}$$
$$+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{01}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$

$$+g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$-g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}$$
$$+g^{02}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{3}{4}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}$$
$$+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}$$
$$+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-g^{02}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}$$
$$-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}$$
$$-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$

$$+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+g^{03}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}+g^{12}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}$$
$$+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{02}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{03}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-2g^{03}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{12}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$+g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}$$

$$+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}$$
$$-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{00}g^{01}\left(\frac{\partial g_{00}}{\partial x^1}\right)^2$$
$$-\frac{1}{4}g^{01}g^{11}\left(\frac{\partial g_{11}}{\partial x^0}\right)^2-\frac{1}{2}g^{01}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{1}{2}g^{01}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}g^{02}g^{12}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2$$
$$-\frac{1}{2}g^{01}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{2}g^{01}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{2}g^{03}g^{13}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}$$
$$-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^0}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}$$
$$-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}$$
$$+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}$$

$$
\begin{aligned}
&+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}\\
&-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}
\end{aligned}
$$

$$
\begin{aligned}
R_{02} \quad = \quad
&+\frac{1}{2}g^{01}\frac{\partial^2 g_{12}}{\partial x^0\partial x^0}-\frac{1}{2}g^{01}\frac{\partial^2 g_{02}}{\partial x^0\partial x^1}-\frac{1}{2}g^{01}\frac{\partial^2 g_{01}}{\partial x^0\partial x^2}+\frac{1}{2}g^{01}\frac{\partial^2 g_{00}}{\partial x^1\partial x^2}\\
&+\frac{1}{2}g^{02}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0}-g^{02}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2}+\frac{1}{2}g^{02}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2}+\frac{1}{2}g^{11}\frac{\partial^2 g_{12}}{\partial x^0\partial x^1}\\
&-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^2}-\frac{1}{2}g^{11}\frac{\partial^2 g_{02}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{01}}{\partial x^1\partial x^2}+\frac{1}{2}g^{03}\frac{\partial^2 g_{23}}{\partial x^0\partial x^0}\\
&-\frac{1}{2}g^{03}\frac{\partial^2 g_{03}}{\partial x^0\partial x^2}-\frac{1}{2}g^{03}\frac{\partial^2 g_{02}}{\partial x^0\partial x^3}+\frac{1}{2}g^{03}\frac{\partial^2 g_{00}}{\partial x^2\partial x^3}+\frac{1}{2}g^{12}\frac{\partial^2 g_{22}}{\partial x^0\partial x^1}\\
&-\frac{1}{2}g^{12}\frac{\partial^2 g_{12}}{\partial x^0\partial x^2}-\frac{1}{2}g^{12}\frac{\partial^2 g_{02}}{\partial x^1\partial x^2}+\frac{1}{2}g^{12}\frac{\partial^2 g_{01}}{\partial x^2\partial x^2}+\frac{1}{2}g^{13}\frac{\partial^2 g_{23}}{\partial x^0\partial x^1}\\
&-g^{13}\frac{\partial^2 g_{13}}{\partial x^0\partial x^2}+\frac{1}{2}g^{13}\frac{\partial^2 g_{12}}{\partial x^0\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{03}}{\partial x^1\partial x^2}-g^{13}\frac{\partial^2 g_{02}}{\partial x^1\partial x^3}\\
&+g^{13}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}-\frac{1}{2}g^{13}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}-\frac{1}{2}g^{23}\frac{\partial^2 g_{23}}{\partial x^0\partial x^2}+\frac{1}{2}g^{23}\frac{\partial^2 g_{22}}{\partial x^0\partial x^3}\\
&+\frac{1}{2}g^{23}\frac{\partial^2 g_{03}}{\partial x^2\partial x^2}-\frac{1}{2}g^{23}\frac{\partial^2 g_{02}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^2}+\frac{1}{2}g^{33}\frac{\partial^2 g_{23}}{\partial x^0\partial x^3}\\
&+\frac{1}{2}g^{33}\frac{\partial^2 g_{03}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{02}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^0}\\
&-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}\\
&+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}\\
&-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}\\
&-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+g^{01}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-g^{01}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}\\
&+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{01}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}\\
&-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}\\
&+g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&+g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}\\
&+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}\\
&-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-g^{01}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+g^{11}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}\\
&+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}\\
&-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}
\end{aligned}
$$

$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$+g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$+g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}$$
$$-g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$+g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$+g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$+g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}$$

$$
-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+g^{11}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}
$$
$$
+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}
$$
$$
+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}
$$
$$
-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}-g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-g^{12}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}
$$
$$
+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{12}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}
$$
$$
+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}
$$
$$
+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+g^{02}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}
$$
$$
-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}
$$
$$
-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}
$$
$$
-g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}+g^{12}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}
$$
$$
+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}
$$
$$
-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}
$$

$$
\begin{aligned}
&-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{13}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{00}g^{02}\left(\frac{\partial g_{00}}{\partial x^2}\right)^2+\frac{1}{2}g^{01}g^{12}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2\\
&-\frac{1}{2}g^{02}g^{11}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{1}{2}g^{02}g^{11}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2-\frac{1}{4}g^{02}g^{22}\left(\frac{\partial g_{22}}{\partial x^0}\right)^2-\frac{1}{2}g^{02}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2\\
&-\frac{1}{2}g^{02}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+g^{03}g^{23}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2-\frac{1}{2}g^{03}g^{23}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}+\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2}+\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
R_{03} \;=\;& +\frac{1}{2}g^{01}\frac{\partial^2 g_{13}}{\partial x^0\partial x^0}-\frac{1}{2}g^{01}\frac{\partial^2 g_{03}}{\partial x^0\partial x^1}-\frac{1}{2}g^{01}\frac{\partial^2 g_{01}}{\partial x^0\partial x^3}+\frac{1}{2}g^{01}\frac{\partial^2 g_{00}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{02}\frac{\partial^2 g_{23}}{\partial x^0\partial x^0}-\frac{1}{2}g^{02}\frac{\partial^2 g_{03}}{\partial x^0\partial x^2}-\frac{1}{2}g^{02}\frac{\partial^2 g_{02}}{\partial x^0\partial x^3}+\frac{1}{2}g^{02}\frac{\partial^2 g_{00}}{\partial x^2\partial x^3}\\
&+\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{03}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{01}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{03}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}-g^{03}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}+\frac{1}{2}g^{03}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}+\frac{1}{2}g^{12}\frac{\partial^2 g_{23}}{\partial x^0\partial x^1}\\
&+\frac{1}{2}g^{12}\frac{\partial^2 g_{13}}{\partial x^0\partial x^2}-g^{12}\frac{\partial^2 g_{12}}{\partial x^0\partial x^3}-g^{12}\frac{\partial^2 g_{03}}{\partial x^1\partial x^2}+g^{12}\frac{\partial^2 g_{02}}{\partial x^1\partial x^3}\\
&-\frac{1}{2}g^{12}\frac{\partial^2 g_{02}}{\partial x^1\partial x^3}+\frac{1}{2}g^{12}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{33}}{\partial x^0\partial x^1}-\frac{1}{2}g^{13}\frac{\partial^2 g_{13}}{\partial x^0\partial x^3}\\
&-\frac{1}{2}g^{13}\frac{\partial^2 g_{03}}{\partial x^1\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{01}}{\partial x^3\partial x^3}+\frac{1}{2}g^{22}\frac{\partial^2 g_{23}}{\partial x^0\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^3}\\
&-\frac{1}{2}g^{22}\frac{\partial^2 g_{03}}{\partial x^2\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{02}}{\partial x^2\partial x^3}+\frac{1}{2}g^{23}\frac{\partial^2 g_{33}}{\partial x^0\partial x^2}-\frac{1}{2}g^{23}\frac{\partial^2 g_{23}}{\partial x^0\partial x^3}\\
&-\frac{1}{2}g^{23}\frac{\partial^2 g_{03}}{\partial x^2\partial x^3}+\frac{1}{2}g^{23}\frac{\partial^2 g_{02}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&+g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{3}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{3}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}\\
&+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}-g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}\\
&+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{3}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{3}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{01}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}
\end{aligned}
$$

$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}$$
$$+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}$$
$$-g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}$$
$$+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}$$
$$-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{02}g^{03}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$+g^{11}g^{03}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}$$
$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}\\
&+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}\\
&+g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&+g^{03}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}-g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}
\end{aligned}
$$

$$-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$+g^{03}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$+g^{03}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-g^{12}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$+g^{12}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}$$
$$-g^{12}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+g^{13}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$

$$
\begin{aligned}
&-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}\\
&+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{00}g^{03}\left(\frac{\partial g_{00}}{\partial x^3}\right)^2\\
&+\frac{1}{2}g^{01}g^{13}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2-\frac{1}{2}g^{11}g^{03}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{2}g^{11}g^{03}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{2}g^{02}g^{23}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2\\
&-\frac{1}{2}g^{03}g^{22}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2-\frac{1}{2}g^{03}g^{22}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2-\frac{1}{4}g^{03}g^{33}\left(\frac{\partial g_{33}}{\partial x^0}\right)^2+\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&+\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}
\end{aligned}
$$

$$
R_{11} = -\frac{1}{2}g^{00}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}+g^{02}\frac{\partial^2 g_{12}}{\partial x^0\partial x^1}
$$

$$-g^{02}\frac{\partial^2 g_{11}}{\partial x^0\partial x^2}-g^{02}\frac{\partial^2 g_{02}}{\partial x^1\partial x^1}+g^{02}\frac{\partial^2 g_{01}}{\partial x^1\partial x^2}+g^{03}\frac{\partial^2 g_{13}}{\partial x^0\partial x^1}$$
$$-g^{03}\frac{\partial^2 g_{11}}{\partial x^0\partial x^3}-g^{03}\frac{\partial^2 g_{03}}{\partial x^1\partial x^1}+g^{03}\frac{\partial^2 g_{01}}{\partial x^1\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}$$
$$+g^{22}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}-g^{23}\frac{\partial^2 g_{23}}{\partial x^1\partial x^1}+g^{23}\frac{\partial^2 g_{13}}{\partial x^1\partial x^2}$$
$$+g^{23}\frac{\partial^2 g_{12}}{\partial x^1\partial x^3}-g^{23}\frac{\partial^2 g_{11}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}+g^{33}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}$$
$$-\frac{1}{2}g^{33}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^0}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^1}-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}$$
$$+g^{00}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2}$$
$$-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+g^{00}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^0}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}$$
$$-g^{00}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^0}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}$$
$$+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}$$
$$+g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}$$
$$-g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+g^{01}g^{02}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}$$
$$-g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}-g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^1}$$
$$-g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}$$
$$-g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}$$
$$+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}$$
$$-g^{00}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+g^{01}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}$$
$$-g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}-g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}$$
$$+g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+g^{00}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-g^{00}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-g^{00}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}$$
$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+g^{00}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-g^{00}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+g^{00}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}$$
$$-g^{00}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}+g^{00}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}$$

$$+g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{01}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}$$
$$+g^{02}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+g^{02}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+g^{02}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-3g^{02}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$+g^{02}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-g^{02}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$-g^{02}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+g^{02}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+g^{02}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+g^{02}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}$$
$$-g^{02}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}$$
$$+g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-2g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}$$
$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{01}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-g^{01}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$-g^{01}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+g^{02}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}$$
$$-g^{02}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$+g^{02}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-g^{02}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$-g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}$$
$$-g^{03}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$

$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{01}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$-g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}-g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-g^{02}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+g^{02}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{02}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$-2g^{02}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{02}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$+g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-2g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}$$
$$+g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-g^{03}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-g^{03}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{03}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{03}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+g^{03}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-g^{03}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-g^{03}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{03}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-g^{03}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-g^{03}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{12}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}$$
$$+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$-g^{02}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+g^{02}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{02}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{02}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{02}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$-g^{02}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+g^{02}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}$$
$$-g^{02}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{02}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{03}g^{23}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$+g^{03}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{03}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+g^{03}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{03}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-g^{03}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$-2g^{03}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{13}g^{22}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}$$

$$+g^{03}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+g^{03}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-g^{03}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{03}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{12}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-2g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{13}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-g^{22}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{13}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{22}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-g^{22}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}$$
$$+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+g^{23}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{3}{2}g^{23}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{23}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+g^{23}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{11}}{\partial x^0}\right)^2$$
$$+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2$$
$$+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{11}}{\partial x^2}\right)^2+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{11}}{\partial x^3}\right)^2$$
$$+g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2$$
$$+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}+\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}-\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}$$
$$+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\left(g^{02}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}$$
$$+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\left(g^{02}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-\left(g^{03}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\left(g^{03}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\left(g^{23}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$-\left(g^{23}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\left(g^{23}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^1}\right)^2-\frac{1}{2}\left(g^{02}\right)^2\left(\frac{\partial g_{12}}{\partial x^0}\right)^2$$
$$+\frac{1}{2}\left(g^{02}\right)^2\left(\frac{\partial g_{02}}{\partial x^1}\right)^2-\frac{1}{2}\left(g^{02}\right)^2\left(\frac{\partial g_{01}}{\partial x^2}\right)^2-\frac{1}{2}\left(g^{03}\right)^2\left(\frac{\partial g_{13}}{\partial x^0}\right)^2+\frac{1}{2}\left(g^{03}\right)^2\left(\frac{\partial g_{03}}{\partial x^1}\right)^2$$
$$+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^1}\right)^2+\left(g^{23}\right)^2\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{2}\left(g^{23}\right)^2\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{2}\left(g^{23}\right)^2\left(\frac{\partial g_{13}}{\partial x^2}\right)^2$$
$$-\frac{1}{2}\left(g^{23}\right)^2\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^1}\right)^2$$

$$
\begin{aligned}
R_{12} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^2 g_{12}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^2}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^2}\\
&-\frac{1}{2}g^{01}\frac{\partial^2 g_{12}}{\partial x^0\partial x^1}+\frac{1}{2}g^{01}\frac{\partial^2 g_{11}}{\partial x^0\partial x^2}+\frac{1}{2}g^{01}\frac{\partial^2 g_{02}}{\partial x^1\partial x^1}-\frac{1}{2}g^{01}\frac{\partial^2 g_{01}}{\partial x^1\partial x^2}\\
&+\frac{1}{2}g^{02}\frac{\partial^2 g_{22}}{\partial x^0\partial x^1}-\frac{1}{2}g^{02}\frac{\partial^2 g_{12}}{\partial x^0\partial x^2}-\frac{1}{2}g^{02}\frac{\partial^2 g_{02}}{\partial x^1\partial x^2}+\frac{1}{2}g^{02}\frac{\partial^2 g_{01}}{\partial x^2\partial x^2}\\
&+\frac{1}{2}g^{03}\frac{\partial^2 g_{23}}{\partial x^0\partial x^1}+\frac{1}{2}g^{03}\frac{\partial^2 g_{13}}{\partial x^0\partial x^2}-g^{03}\frac{\partial^2 g_{12}}{\partial x^0\partial x^3}-g^{03}\frac{\partial^2 g_{03}}{\partial x^1\partial x^2}\\
&+\frac{1}{2}g^{03}\frac{\partial^2 g_{02}}{\partial x^1\partial x^3}+g^{03}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}-\frac{1}{2}g^{03}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}+\frac{1}{2}g^{12}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}\\
&-g^{12}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}+\frac{1}{2}g^{12}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}+\frac{1}{2}g^{13}\frac{\partial^2 g_{23}}{\partial x^1\partial x^1}-\frac{1}{2}g^{13}\frac{\partial^2 g_{13}}{\partial x^1\partial x^2}\\
&-\frac{1}{2}g^{13}\frac{\partial^2 g_{12}}{\partial x^1\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{11}}{\partial x^2\partial x^3}-\frac{1}{2}g^{23}\frac{\partial^2 g_{23}}{\partial x^1\partial x^2}+\frac{1}{2}g^{23}\frac{\partial^2 g_{22}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{23}\frac{\partial^2 g_{13}}{\partial x^2\partial x^2}-\frac{1}{2}g^{23}\frac{\partial^2 g_{12}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^2}+\frac{1}{2}g^{33}\frac{\partial^2 g_{23}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{33}\frac{\partial^2 g_{13}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{12}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}\\
&+g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{3}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}\\
&-g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+g^{00}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}
\end{aligned}
$$

$$+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}+g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{3}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}$$
$$+g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}$$
$$-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}$$
$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}$$
$$+g^{00}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$+g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+g^{01}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$-g^{01}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{02}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}$$
$$+g^{02}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{3}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$

$$
-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}
$$
$$
+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}
$$
$$
-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}
$$
$$
+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}
$$
$$
-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}
$$
$$
+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}
$$
$$
+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{03}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}
$$
$$
-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}
$$
$$
+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}
$$
$$
+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}
$$
$$
+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+g^{02}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}
$$
$$
+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}
$$
$$
+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}
$$

$$-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{12}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}$$
$$-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+g^{12}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$

$$
\begin{aligned}
&+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+g^{13}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{3}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{3}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{23}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{00}g^{12}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2\\
&-\frac{1}{2}g^{00}g^{12}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+g^{01}g^{02}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{1}{2}g^{01}g^{02}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{1}{4}g^{11}g^{12}\left(\frac{\partial g_{11}}{\partial x^2}\right)^2\\
&-\frac{1}{4}g^{12}g^{22}\left(\frac{\partial g_{22}}{\partial x^1}\right)^2-\frac{1}{2}g^{12}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{2}g^{12}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2+\frac{1}{2}g^{13}g^{23}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2\\
&+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}\\
&+\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
R_{13} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{13}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^3}\\
&-\frac{1}{2}g^{01}\frac{\partial^2 g_{13}}{\partial x^0\partial x^1}+\frac{1}{2}g^{01}\frac{\partial^2 g_{11}}{\partial x^0\partial x^3}+\frac{1}{2}g^{01}\frac{\partial^2 g_{03}}{\partial x^1\partial x^1}-\frac{1}{2}g^{01}\frac{\partial^2 g_{01}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{02}\frac{\partial^2 g_{23}}{\partial x^0\partial x^1}-g^{02}\frac{\partial^2 g_{13}}{\partial x^0\partial x^2}+\frac{1}{2}g^{02}\frac{\partial^2 g_{12}}{\partial x^0\partial x^3}+\frac{1}{2}g^{02}\frac{\partial^2 g_{03}}{\partial x^1\partial x^2}\\
&-g^{02}\frac{\partial^2 g_{02}}{\partial x^1\partial x^3}+\frac{1}{2}g^{02}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}+\frac{1}{2}g^{03}\frac{\partial^2 g_{33}}{\partial x^0\partial x^1}-\frac{1}{2}g^{03}\frac{\partial^2 g_{13}}{\partial x^0\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{2}g^{03}\frac{\partial^2 g_{03}}{\partial x^1\partial x^3}+\frac{1}{2}g^{03}\frac{\partial^2 g_{01}}{\partial x^3\partial x^3}+\frac{1}{2}g^{12}\frac{\partial^2 g_{23}}{\partial x^1\partial x^1}-\frac{1}{2}g^{12}\frac{\partial^2 g_{13}}{\partial x^1\partial x^2}\\
&-\frac{1}{2}g^{12}\frac{\partial^2 g_{12}}{\partial x^1\partial x^3}+\frac{1}{2}g^{12}\frac{\partial^2 g_{11}}{\partial x^2\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}-g^{13}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{13}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}+\frac{1}{2}g^{22}\frac{\partial^2 g_{23}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{13}}{\partial x^2\partial x^2}\\
&+\frac{1}{2}g^{22}\frac{\partial^2 g_{12}}{\partial x^2\partial x^3}+\frac{1}{2}g^{23}\frac{\partial^2 g_{33}}{\partial x^1\partial x^2}-\frac{1}{2}g^{23}\frac{\partial^2 g_{23}}{\partial x^1\partial x^3}-\frac{1}{2}g^{23}\frac{\partial^2 g_{13}}{\partial x^2\partial x^3}\\
&+\frac{1}{2}g^{23}\frac{\partial^2 g_{12}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{3}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}\\
&-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&-g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&+g^{00}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&+g^{00}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}
\end{aligned}
$$

$$+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{01}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}$$
$$+g^{02}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{3}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}$$
$$+g^{01}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$+g^{02}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+g^{02}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-g^{02}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$-g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}$$

$$
-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}
$$
$$
+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}
$$
$$
+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}
$$
$$
+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}
$$
$$
-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}
$$
$$
-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+g^{02}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}
$$
$$
+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+g^{02}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}
$$
$$
+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}
$$
$$
-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}
$$
$$
+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}
$$
$$
+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}
$$
$$
-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}
$$
$$
+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}
$$
$$
-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}
$$
$$
+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&+g^{03}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+g^{03}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+g^{13}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{22}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{13}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2-\frac{1}{2}g^{00}g^{13}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{2}g^{01}g^{03}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{4}g^{11}g^{13}\left(\frac{\partial g_{11}}{\partial x^3}\right)^2\\
&+\frac{1}{2}g^{12}g^{23}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{2}g^{13}g^{22}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{2}g^{13}g^{22}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2-\frac{1}{4}g^{13}g^{33}\left(\frac{\partial g_{33}}{\partial x^1}\right)^2\\
&+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
R_{22} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2}-g^{01}\frac{\partial^2 g_{22}}{\partial x^0\partial x^1}\\
&+g^{01}\frac{\partial^2 g_{12}}{\partial x^0\partial x^2}+g^{01}\frac{\partial^2 g_{02}}{\partial x^1\partial x^2}-g^{01}\frac{\partial^2 g_{01}}{\partial x^2\partial x^2}-\frac{1}{2}g^{11}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}\\
&+g^{11}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}+g^{03}\frac{\partial^2 g_{23}}{\partial x^0\partial x^2}-g^{03}\frac{\partial^2 g_{22}}{\partial x^0\partial x^3}\\
&+g^{03}\frac{\partial^2 g_{02}}{\partial x^2\partial x^3}+g^{13}\frac{\partial^2 g_{23}}{\partial x^1\partial x^2}-g^{13}\frac{\partial^2 g_{22}}{\partial x^1\partial x^3}-g^{13}\frac{\partial^2 g_{13}}{\partial x^2\partial x^2}\\
&+g^{13}\frac{\partial^2 g_{12}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}+g^{33}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}\\
&+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+g^{00}g^{01}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}-\frac{3}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}
\end{aligned}
$$

$$
\begin{aligned}
&-g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&+g^{00}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+g^{00}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-g^{00}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&-g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}+g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&-g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}\\
&+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}\\
&+g^{00}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-g^{00}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}\\
&-g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{00}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+g^{00}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-g^{00}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-g^{00}g^{13}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+g^{01}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}\\
&-g^{01}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+g^{01}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+g^{01}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-g^{01}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}\\
&+g^{01}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-g^{01}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+g^{01}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}\\
&-g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}+g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-2g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+g^{01}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}\\
&-g^{01}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}\\
&-g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-g^{02}g^{11}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}\\
&-g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+g^{01}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}\\
&-g^{01}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{01}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-3g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-g^{01}g^{13}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}\\
&+g^{01}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}
\end{aligned}
$$

$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+g^{02}g^{03}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}$$
$$-g^{02}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+g^{02}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+g^{02}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-g^{02}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}$$
$$-g^{02}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-g^{11}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+g^{11}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{11}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{11}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{11}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}$$
$$-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+g^{11}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-g^{11}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^1}$$
$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}-g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}-\frac{3}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}$$
$$+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{00}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}$$
$$-g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+g^{02}g^{13}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}$$
$$+g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+g^{02}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{02}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-g^{02}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+g^{11}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{11}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}$$
$$+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}-g^{03}g^{12}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$

$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-g^{01}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+g^{01}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-g^{01}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-g^{01}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$-g^{01}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+g^{01}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{11}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-g^{11}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+g^{03}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-g^{03}g^{13}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$-2g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{03}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+g^{03}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-g^{03}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+g^{03}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{03}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-g^{03}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-g^{03}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+g^{03}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$+g^{03}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-g^{03}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-g^{03}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}$$
$$+g^{12}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-2g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}$$
$$-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{02}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$-g^{11}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}$$
$$-g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$+g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}$$
$$+g^{03}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-g^{03}g^{33}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}$$
$$-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{12}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{13}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+g^{13}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$

$$
\begin{aligned}
&+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-g^{13}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+g^{13}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{13}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&-g^{13}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{23}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{23}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2\\
&+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{22}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2\\
&+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{22}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2\\
&+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{22}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\left(g^{01}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\left(g^{01}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\left(g^{01}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}\\
&+\left(g^{02}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\left(g^{02}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}\\
&+\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\left(g^{03}\right)^2\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\left(g^{03}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&-\left(g^{13}\right)^2\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\left(g^{13}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}\\
&+\left(g^{13}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^2}\right)^2\\
&-\frac{1}{2}\left(g^{01}\right)^2\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{1}{2}\left(g^{01}\right)^2\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}\left(g^{01}\right)^2\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^2}\right)^2\\
&-\frac{1}{2}\left(g^{03}\right)^2\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}\left(g^{03}\right)^2\left(\frac{\partial g_{03}}{\partial x^2}\right)^2-\frac{1}{2}\left(g^{03}\right)^2\left(\frac{\partial g_{02}}{\partial x^3}\right)^2-\frac{1}{2}\left(g^{13}\right)^2\left(\frac{\partial g_{23}}{\partial x^1}\right)^2\\
&+\left(g^{13}\right)^2\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{2}\left(g^{13}\right)^2\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{2}\left(g^{13}\right)^2\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^2}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{23} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{23}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^2}+\frac{1}{2}g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^2\partial x^3}\\
&-g^{01}\frac{\partial^2 g_{23}}{\partial x^0\partial x^1}+\frac{1}{2}g^{01}\frac{\partial^2 g_{13}}{\partial x^0\partial x^2}+g^{01}\frac{\partial^2 g_{12}}{\partial x^0\partial x^3}-\frac{1}{2}g^{01}\frac{\partial^2 g_{12}}{\partial x^0\partial x^3}\\
&+\frac{1}{2}g^{01}\frac{\partial^2 g_{03}}{\partial x^1\partial x^2}+\frac{1}{2}g^{01}\frac{\partial^2 g_{02}}{\partial x^1\partial x^3}-g^{01}\frac{\partial^2 g_{01}}{\partial x^2\partial x^3}-\frac{1}{2}g^{02}\frac{\partial^2 g_{23}}{\partial x^0\partial x^2}\\
&+\frac{1}{2}g^{02}\frac{\partial^2 g_{22}}{\partial x^0\partial x^3}+\frac{1}{2}g^{02}\frac{\partial^2 g_{03}}{\partial x^2\partial x^2}-\frac{1}{2}g^{02}\frac{\partial^2 g_{02}}{\partial x^2\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{23}}{\partial x^1\partial x^1}\\
&+\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^1\partial x^2}+\frac{1}{2}g^{11}\frac{\partial^2 g_{12}}{\partial x^1\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^2\partial x^3}+\frac{1}{2}g^{03}\frac{\partial^2 g_{33}}{\partial x^0\partial x^2}\\
&-\frac{1}{2}g^{03}\frac{\partial^2 g_{23}}{\partial x^0\partial x^3}-\frac{1}{2}g^{03}\frac{\partial^2 g_{03}}{\partial x^2\partial x^3}+\frac{1}{2}g^{03}\frac{\partial^2 g_{02}}{\partial x^3\partial x^3}-\frac{1}{2}g^{12}\frac{\partial^2 g_{23}}{\partial x^1\partial x^2}\\
&+\frac{1}{2}g^{12}\frac{\partial^2 g_{22}}{\partial x^1\partial x^3}+\frac{1}{2}g^{12}\frac{\partial^2 g_{13}}{\partial x^2\partial x^2}-\frac{1}{2}g^{12}\frac{\partial^2 g_{12}}{\partial x^2\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{33}}{\partial x^1\partial x^2}
\end{aligned}
$$

$$-\frac{1}{2}g^{13}\frac{\partial^2 g_{23}}{\partial x^1\partial x^3}-\frac{1}{2}g^{13}\frac{\partial^2 g_{13}}{\partial x^2\partial x^3}+\frac{1}{2}g^{13}\frac{\partial^2 g_{12}}{\partial x^3\partial x^3}+\frac{1}{2}g^{23}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}$$
$$-g^{23}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}+\frac{1}{2}g^{23}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}$$
$$+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{3}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}$$
$$+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}$$
$$+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}$$
$$-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$-g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{01}g^{02}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}$$

$$-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{01}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}$$
$$+g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}$$
$$-\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+g^{00}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{02}g^{03}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{02}g^{12}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+g^{11}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$

$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+g^{11}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}$$
$$-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{3}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{3}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+g^{01}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{01}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+g^{01}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{01}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{02}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}$$
$$+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+g^{03}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}$$
$$+g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{01}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{01}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$

$$-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$+g^{11}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{03}g^{13}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{13}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+g^{12}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+g^{12}g^{13}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{3}{2}g^{12}g^{13}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}$$
$$-\frac{1}{4}g^{12}g^{22}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{4}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{02}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{23}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+g^{12}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$+g^{12}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}$$
$$+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{03}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{03}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{4}g^{12}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}$$
$$+g^{13}g^{23}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{13}g^{23}\frac{\partial g_{13}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{13}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{13}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$

$$
\begin{aligned}
&+\frac{1}{2}g^{23}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{23}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2-\frac{1}{2}g^{00}g^{23}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2\\
&+\frac{1}{2}g^{02}g^{03}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2-\frac{1}{2}g^{11}g^{23}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{2}g^{11}g^{23}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+g^{12}g^{13}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2\\
&-\frac{1}{2}g^{12}g^{13}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{4}g^{22}g^{23}\left(\frac{\partial g_{22}}{\partial x^3}\right)^2-\frac{1}{4}g^{23}g^{33}\left(\frac{\partial g_{33}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{4}\left(g^{03}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}\left(g^{03}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{13}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}\left(g^{13}\right)^2\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\left(g^{23}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{23}\right)^2\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
R_{33} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}-g^{01}\frac{\partial^2 g_{33}}{\partial x^0\partial x^1}\\
&+g^{01}\frac{\partial^2 g_{13}}{\partial x^0\partial x^3}+g^{01}\frac{\partial^2 g_{03}}{\partial x^1\partial x^3}-g^{01}\frac{\partial^2 g_{01}}{\partial x^3\partial x^3}-g^{02}\frac{\partial^2 g_{33}}{\partial x^0\partial x^2}\\
&+g^{02}\frac{\partial^2 g_{03}}{\partial x^2\partial x^3}-g^{02}\frac{\partial^2 g_{02}}{\partial x^3\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}+g^{11}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}\\
&-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}-g^{12}\frac{\partial^2 g_{33}}{\partial x^1\partial x^2}+g^{12}\frac{\partial^2 g_{23}}{\partial x^1\partial x^3}+g^{12}\frac{\partial^2 g_{13}}{\partial x^2\partial x^3}\\
&-g^{12}\frac{\partial^2 g_{12}}{\partial x^3\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}+g^{22}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}\\
&+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{01}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{01}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{00}g^{01}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{02}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{00}g^{02}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}
\end{aligned}
$$

$$+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{03}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{2}g^{00}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{00}g^{12}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-g^{00}g^{12}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}$$
$$-\frac{1}{2}g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+g^{00}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{00}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-g^{00}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}$$
$$-g^{00}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}+g^{00}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}+g^{00}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$-g^{01}g^{02}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-g^{01}g^{02}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}$$
$$-2g^{01}g^{02}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-g^{01}g^{02}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}$$
$$-g^{01}g^{02}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{02}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-g^{01}g^{02}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+g^{01}g^{02}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$-g^{01}g^{02}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+g^{01}g^{02}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+g^{01}g^{02}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^0}-g^{01}g^{02}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}$$
$$+g^{01}g^{02}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}$$
$$-g^{01}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{11}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{11}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}$$
$$-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-g^{00}g^{13}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$
$$-\frac{1}{4}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}$$
$$+g^{00}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+g^{00}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}$$
$$-g^{00}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{01}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$-g^{01}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{01}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{01}g^{12}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-2g^{01}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$-g^{01}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}-g^{01}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+g^{01}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{01}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+g^{01}g^{12}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{02}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$-g^{02}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+g^{02}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$-g^{02}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-g^{02}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+g^{02}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+g^{02}g^{11}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}$$
$$-g^{02}g^{11}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{02}g^{11}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$+\frac{1}{2}g^{02}g^{11}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{02}g^{11}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}$$

$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{00}g^{23}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}$$
$$+g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-g^{01}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-2g^{01}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+g^{01}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-g^{01}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+g^{01}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{01}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}$$
$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{01}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{01}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+g^{01}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-g^{01}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+g^{01}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-g^{01}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{4}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-g^{01}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+g^{01}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}$$
$$+\frac{1}{2}g^{01}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-g^{01}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{01}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{03}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+g^{02}g^{03}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-2g^{02}g^{03}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+g^{02}g^{03}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}$$
$$-g^{02}g^{03}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{02}g^{03}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-g^{02}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$+g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-2g^{02}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-g^{02}g^{12}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+g^{02}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}$$
$$-g^{02}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+g^{02}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{12}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{02}g^{12}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}$$
$$+g^{02}g^{12}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}-g^{02}g^{12}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-g^{02}g^{12}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}$$
$$+g^{02}g^{12}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$+g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-g^{11}g^{03}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$+g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}-g^{11}g^{03}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-g^{11}g^{03}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}$$
$$-\frac{1}{4}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{11}g^{03}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{2}g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{11}g^{12}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{12}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}$$
$$+g^{11}g^{12}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+g^{11}g^{12}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$
$$-g^{01}g^{23}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{01}g^{23}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}$$
$$+g^{01}g^{23}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{01}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{01}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$-g^{02}g^{13}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-g^{02}g^{13}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-g^{02}g^{13}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}$$
$$-g^{02}g^{13}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+g^{02}g^{13}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}g^{02}g^{13}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}$$

$$+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{02}g^{13}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{2}g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{02}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+g^{02}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{02}g^{22}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}$$
$$-\frac{1}{2}g^{02}g^{22}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{11}g^{13}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}-g^{11}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}$$
$$-g^{03}g^{12}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$+g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}$$
$$+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{03}g^{12}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}$$
$$-\frac{1}{2}g^{03}g^{12}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-g^{03}g^{12}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}+g^{03}g^{12}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}$$
$$-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{01}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{01}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}$$
$$-\frac{1}{2}g^{02}g^{23}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-g^{02}g^{23}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$-2g^{02}g^{23}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+g^{02}g^{23}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{02}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{11}g^{23}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}$$
$$+g^{03}g^{13}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}-g^{03}g^{13}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{03}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}$$
$$-\frac{1}{2}g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-g^{03}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}$$
$$+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+g^{03}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}-g^{03}g^{22}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}$$
$$-\frac{1}{4}g^{03}g^{22}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-g^{03}g^{22}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{03}g^{22}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}$$
$$+g^{12}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{12}g^{13}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+g^{12}g^{13}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-2g^{12}g^{13}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}$$
$$+g^{12}g^{13}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-g^{12}g^{13}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+g^{12}g^{13}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}$$
$$+g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}-\frac{3}{2}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{12}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{12}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}$$
$$+\frac{1}{4}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{12}g^{22}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}+g^{12}g^{22}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}$$
$$-\frac{1}{2}g^{02}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{02}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}$$
$$+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+g^{03}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}-g^{03}g^{23}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}+g^{03}g^{23}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}$$
$$-g^{03}g^{23}\frac{\partial g_{03}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-g^{12}g^{23}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}$$
$$+g^{12}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-2g^{12}g^{23}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+g^{12}g^{23}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}$$

$$
\begin{aligned}
&-\frac{1}{2}g^{12}g^{23}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{13}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{13}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{13}g^{22}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{2}g^{13}g^{22}\frac{\partial g_{13}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{12}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{2}g^{12}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+g^{13}g^{23}\frac{\partial g_{13}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-g^{13}g^{23}\frac{\partial g_{13}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{22}g^{23}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{23}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2\\
&+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2\\
&+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{33}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2\\
&+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{33}}{\partial x^1}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{33}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\left(g^{01}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}\left(g^{01}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\left(g^{01}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\left(g^{01}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}\\
&-\left(g^{01}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}\left(g^{02}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\left(g^{02}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\left(g^{02}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&+\left(g^{02}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}\\
&-\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\left(g^{12}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}\left(g^{12}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&+\left(g^{12}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\left(g^{12}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\left(g^{12}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\left(g^{23}\right)^2\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\left(g^{23}\right)^2\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^3}\right)^2\\
&-\frac{1}{2}\left(g^{01}\right)^2\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{2}\left(g^{01}\right)^2\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{2}\left(g^{01}\right)^2\left(\frac{\partial g_{01}}{\partial x^3}\right)^2-\frac{1}{2}\left(g^{02}\right)^2\left(\frac{\partial g_{23}}{\partial x^0}\right)^2\\
&-\frac{1}{2}\left(g^{02}\right)^2\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+\frac{1}{2}\left(g^{02}\right)^2\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^3}\right)^2-\frac{1}{2}\left(g^{12}\right)^2\left(\frac{\partial g_{23}}{\partial x^1}\right)^2\\
&-\frac{1}{2}\left(g^{12}\right)^2\left(\frac{\partial g_{13}}{\partial x^2}\right)^2+\frac{1}{2}\left(g^{12}\right)^2\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^3}\right)^2
\end{aligned}
$$

2.2 Diagonal Tesor Step 1 R_{ij}

Caution ! $g_{i,j}=0, i\neq j$

$$
\begin{aligned}
R_{00} \quad = \quad & -\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}+g^{11}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0}\\
&+g^{22}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}+g^{33}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{00}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}\\
&-g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{00}}{\partial x^1}\right)^2+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{00}}{\partial x^2}\right)^2\\
&+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{00}}{\partial x^3}\right)^2-\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2\\
&-\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2-\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2\\
&+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}\\
&-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^0}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^0}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^0}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{01} \;=\;& -\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^1}+\frac{1}{2}g^{22}\frac{\partial^2 g_{12}}{\partial x^0\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{02}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{01}}{\partial x^2\partial x^2}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^1}+\frac{1}{2}g^{33}\frac{\partial^2 g_{13}}{\partial x^0\partial x^3}+\frac{1}{2}g^{33}\frac{\partial^2 g_{03}}{\partial x^1\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{01}}{\partial x^3\partial x^3}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}
\end{aligned}
$$

$$
\begin{aligned}
R_{02} \;=\;& +\frac{1}{2}g^{11}\frac{\partial^2 g_{12}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^2}-\frac{1}{2}g^{11}\frac{\partial^2 g_{02}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{01}}{\partial x^1\partial x^2}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^2}+\frac{1}{2}g^{33}\frac{\partial^2 g_{23}}{\partial x^0\partial x^3}+\frac{1}{2}g^{33}\frac{\partial^2 g_{03}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{02}}{\partial x^3\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
R_{03} \quad = \quad &+\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{03}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{01}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{22}\frac{\partial^2 g_{23}}{\partial x^0\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{03}}{\partial x^2\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{02}}{\partial x^2\partial x^3}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{33}\frac{\partial g_{03}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}\\
&-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
R_{11} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}\\
&+g^{22}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}+g^{33}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}\\
&-g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{11}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2\\
&-\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2\\
&+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{11}}{\partial x^2}\right)^2+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{11}}{\partial x^3}\right)^2-\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2\\
&+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}\\
&-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^1}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^1}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^1}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{12} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^2 g_{12}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^2}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^2}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^2}+\frac{1}{2}g^{33}\frac{\partial^2 g_{23}}{\partial x^1\partial x^3}+\frac{1}{2}g^{33}\frac{\partial^2 g_{13}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{12}}{\partial x^3\partial x^3}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
&+\frac{1}{4}\left(g^{00}\right)^{2}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{00}}{\partial x^{2}}-\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{23}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{3}}-\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{13}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{3}}+\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{12}}{\partial x^{3}}\frac{\partial g_{33}}{\partial x^{3}}\\
&+\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{33}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{2}}
\end{aligned}
$$

$$
\begin{aligned}
R_{13} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^{2}g_{13}}{\partial x^{0}\partial x^{0}}+\frac{1}{2}g^{00}\frac{\partial^{2}g_{03}}{\partial x^{0}\partial x^{1}}+\frac{1}{2}g^{00}\frac{\partial^{2}g_{01}}{\partial x^{0}\partial x^{3}}-\frac{1}{2}g^{00}\frac{\partial^{2}g_{00}}{\partial x^{1}\partial x^{3}}\\
&+\frac{1}{2}g^{22}\frac{\partial^{2}g_{23}}{\partial x^{1}\partial x^{2}}-\frac{1}{2}g^{22}\frac{\partial^{2}g_{22}}{\partial x^{1}\partial x^{3}}-\frac{1}{2}g^{22}\frac{\partial^{2}g_{13}}{\partial x^{2}\partial x^{2}}+\frac{1}{2}g^{22}\frac{\partial^{2}g_{12}}{\partial x^{2}\partial x^{3}}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{11}}{\partial x^{3}}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{13}}{\partial x^{0}}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{01}}{\partial x^{3}}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^{1}}\frac{\partial g_{13}}{\partial x^{0}}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^{1}}\frac{\partial g_{03}}{\partial x^{1}}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^{1}}\frac{\partial g_{01}}{\partial x^{3}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{23}}{\partial x^{1}}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{13}}{\partial x^{2}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{3}}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{23}}{\partial x^{0}}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{2}}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{02}}{\partial x^{3}}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{23}}{\partial x^{0}}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{03}}{\partial x^{2}}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{0}}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{01}}{\partial x^{3}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{33}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{0}}\\
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{3}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{0}}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{03}}{\partial x^{3}}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{33}}{\partial x^{0}}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{03}}{\partial x^{3}}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{1}}\frac{\partial g_{23}}{\partial x^{1}}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{1}}\frac{\partial g_{13}}{\partial x^{2}}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{3}}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^{2}}\frac{\partial g_{23}}{\partial x^{1}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^{2}}\frac{\partial g_{13}}{\partial x^{2}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{3}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^{1}}\frac{\partial g_{11}}{\partial x^{3}}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{1}}-g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{1}}\frac{\partial g_{13}}{\partial x^{3}}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^{3}}\frac{\partial g_{13}}{\partial x^{3}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{2}}\\
&-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{1}}\frac{\partial g_{23}}{\partial x^{3}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{2}}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^{2}}\frac{\partial g_{23}}{\partial x^{3}}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^{3}}\frac{\partial g_{33}}{\partial x^{2}}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{3}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{3}}+\frac{1}{4}\left(g^{00}\right)^{2}\frac{\partial g_{00}}{\partial x^{0}}\frac{\partial g_{13}}{\partial x^{0}}-\frac{1}{4}\left(g^{00}\right)^{2}\frac{\partial g_{00}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{1}}\\
&-\frac{1}{4}\left(g^{00}\right)^{2}\frac{\partial g_{00}}{\partial x^{0}}\frac{\partial g_{01}}{\partial x^{3}}+\frac{1}{4}\left(g^{00}\right)^{2}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{00}}{\partial x^{3}}+\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{22}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{3}}-\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{23}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{2}}\\
&+\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{13}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{2}}-\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{22}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{3}}
\end{aligned}
$$

$$
\begin{aligned}
R_{22} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^{2}g_{22}}{\partial x^{0}\partial x^{0}}+g^{00}\frac{\partial^{2}g_{02}}{\partial x^{0}\partial x^{2}}-\frac{1}{2}g^{00}\frac{\partial^{2}g_{00}}{\partial x^{2}\partial x^{2}}-\frac{1}{2}g^{11}\frac{\partial^{2}g_{22}}{\partial x^{1}\partial x^{1}}\\
&+g^{11}\frac{\partial^{2}g_{12}}{\partial x^{1}\partial x^{2}}-\frac{1}{2}g^{11}\frac{\partial^{2}g_{11}}{\partial x^{2}\partial x^{2}}-\frac{1}{2}g^{33}\frac{\partial^{2}g_{33}}{\partial x^{2}\partial x^{2}}+g^{33}\frac{\partial^{2}g_{23}}{\partial x^{2}\partial x^{3}}\\
&-\frac{1}{2}g^{33}\frac{\partial^{2}g_{22}}{\partial x^{3}\partial x^{3}}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{1}}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{2}}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{0}}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{2}}-g^{00}g^{11}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{2}}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{2}}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{2}}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{22}}{\partial x^{3}}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{0}}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{0}}\\
&-g^{00}g^{33}\frac{\partial g_{23}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{3}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{2}}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{2}}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{22}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{1}}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{1}}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{2}}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^{3}}\frac{\partial g_{22}}{\partial x^{3}}-g^{11}g^{33}\frac{\partial g_{23}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{3}}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{2}}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{3}}+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{12}}{\partial x^{0}}\right)^{2}+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{02}}{\partial x^{1}}\right)^{2}\\
&-\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^{2}}\right)^{2}+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{22}}{\partial x^{0}}\right)^{2}+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{23}}{\partial x^{0}}\right)^{2}-\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^{2}}\right)^{2}
\end{aligned}
$$

$$
\begin{aligned}
&+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{22}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2\\
&+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{22}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^2}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{23} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{23}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^2}+\frac{1}{2}g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^2\partial x^3}\\
&-\frac{1}{2}g^{11}\frac{\partial^2 g_{23}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^1\partial x^2}+\frac{1}{2}g^{11}\frac{\partial^2 g_{12}}{\partial x^1\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^2\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
R_{33} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}\\
&+g^{11}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}+g^{22}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}\\
&-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-g^{11}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2\\
&-\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2-\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2\\
&+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{33}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2\\
&+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{33}}{\partial x^1}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{33}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^3}\right)^2
\end{aligned}
$$

2.3 Diagonal Tesor Step 2 R_{ij}

Caution ! $g_{i,j}=0, i\neq j$ and $\frac{\partial g_{0k}}{\partial x^0}=0, k\neq 0$

$$
\begin{aligned}
R_{00} \;=\;& -\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}+g^{11}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0}\\
&+g^{22}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}+g^{33}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&-g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{00}}{\partial x^1}\right)^2+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{00}}{\partial x^2}\right)^2+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{00}}{\partial x^3}\right)^2\\
&-\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2-\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2\\
&+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2-\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2\\
&+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^0}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^0}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^0}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{01} \;=\;& -\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^1}+\frac{1}{2}g^{22}\frac{\partial^2 g_{12}}{\partial x^0\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{02}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{01}}{\partial x^2\partial x^2}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^1}+\frac{1}{2}g^{33}\frac{\partial^2 g_{13}}{\partial x^0\partial x^3}+\frac{1}{2}g^{33}\frac{\partial^2 g_{03}}{\partial x^1\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{01}}{\partial x^3\partial x^3}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^1}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}
\end{aligned}
$$

$$
\begin{aligned}
R_{02} \;=\;& +\frac{1}{2}g^{11}\frac{\partial^2 g_{12}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^2}-\frac{1}{2}g^{11}\frac{\partial^2 g_{02}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{01}}{\partial x^1\partial x^2}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^2}+\frac{1}{2}g^{33}\frac{\partial^2 g_{23}}{\partial x^0\partial x^3}+\frac{1}{2}g^{33}\frac{\partial^2 g_{03}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{02}}{\partial x^3\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^2}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
R_{03} \;=\;& +\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{03}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{01}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{22}\frac{\partial^2 g_{23}}{\partial x^0\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{03}}{\partial x^2\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{02}}{\partial x^2\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}
\end{aligned}
$$

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\begin{aligned}
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
R_{11} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}\\
&+g^{22}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}+g^{33}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}\\
&-g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{11}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2\\
&-\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2\\
&+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{11}}{\partial x^2}\right)^2+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{11}}{\partial x^3}\right)^2-\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2\\
&+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2+\frac{1}{2}g^{22}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}\\
&-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^1}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^1}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^1}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{12} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^2 g_{12}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^2}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^2}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^2}+\frac{1}{2}g^{33}\frac{\partial^2 g_{23}}{\partial x^1\partial x^3}+\frac{1}{2}g^{33}\frac{\partial^2 g_{13}}{\partial x^2\partial x^3}-\frac{1}{2}g^{33}\frac{\partial^2 g_{12}}{\partial x^3\partial x^3}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{12}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
R_{13} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{13}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{22}\frac{\partial^2 g_{23}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{13}}{\partial x^2\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{12}}{\partial x^2\partial x^3}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
R_{22} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2}-\frac{1}{2}g^{11}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}\\
&+g^{11}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}-\frac{1}{2}g^{33}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}+g^{33}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}\\
&-\frac{1}{2}g^{33}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}\\
&-g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2\\
&-\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{22}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2-\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2\\
&+\frac{1}{2}g^{00}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{22}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2\\
&+\frac{1}{2}g^{11}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{22}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^2}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
R_{23} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{23}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^2}+\frac{1}{2}g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^2\partial x^3}\\
&-\frac{1}{2}g^{11}\frac{\partial^2 g_{23}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^1\partial x^2}+\frac{1}{2}g^{11}\frac{\partial^2 g_{12}}{\partial x^1\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^2\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
R_{33} \quad = \quad & -\frac{1}{2}g^{00}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}+g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}\\
&+g^{11}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}+g^{22}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}\\
&-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-g^{00}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-g^{11}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2\\
&-\frac{1}{2}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2-\frac{1}{2}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2\\
&+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{33}}{\partial x^0}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{2}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2\\
&+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{33}}{\partial x^1}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{33}}{\partial x^2}\right)^2+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\left(\frac{\partial g_{00}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^3}\right)^2
\end{aligned}
$$

3 The field euations of general relativity

Caution ! $g_{i,j}=0, i\neq j$ and $\frac{\partial g_{0k}}{\partial x^0}=0, k\neq 0$

3.1 R

$$
\begin{aligned}
R \;=\;& -g^{00}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}+2g^{00}g^{11}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}-g^{00}g^{11}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}\\
&-g^{00}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0}+2g^{00}g^{22}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2}-g^{00}g^{22}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2}\\
&-g^{00}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}+2g^{00}g^{33}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}-g^{00}g^{33}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}\\
&-g^{11}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}+2g^{11}g^{22}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}-g^{11}g^{22}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}\\
&-g^{11}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}+2g^{11}g^{33}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}-g^{11}g^{33}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}\\
&-g^{22}g^{33}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}+2g^{22}g^{33}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}-g^{22}g^{33}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}\\
&-\frac{1}{2}g^{00}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{2}g^{00}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}\\
&-\frac{1}{2}g^{00}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-g^{00}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-g^{00}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&-g^{00}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{00}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{2}g^{00}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-g^{00}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&-g^{00}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}-g^{00}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}g^{00}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{00}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-g^{00}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
&-g^{00}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-g^{00}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{2}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}-g^{11}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-g^{11}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-g^{11}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{11}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2\\
&+\frac{1}{2}g^{00}g^{11}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+g^{00}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{2}g^{00}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2\\
&+\frac{1}{2}g^{00}g^{11}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}g^{11}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+g^{00}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2\\
&-\frac{1}{2}g^{00}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{2}g^{00}g^{22}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+\frac{1}{2}g^{00}g^{22}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2\\
&+\frac{1}{2}g^{11}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+\frac{1}{2}g^{11}g^{22}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2+g^{11}g^{22}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2\\
&-\frac{1}{2}g^{11}g^{22}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2+\frac{1}{2}\left(g^{00}\right)^2g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}-\frac{1}{2}\left(g^{00}\right)^2g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}\\
&+\frac{1}{2}g^{00}\left(g^{11}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}-\frac{1}{2}g^{00}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{2}\left(g^{00}\right)^2g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{00}\right)^2g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{2}g^{00}\left(g^{22}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}\left(g^{00}\right)^2g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}\left(g^{00}\right)^2g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}\left(g^{11}\right)^2g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}\\
&-\frac{1}{2}\left(g^{11}\right)^2g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{11}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{2}g^{11}\left(g^{22}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{2}g^{11}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{2}g^{00}\left(g^{33}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{00}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{2}\left(g^{11}\right)^2g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}\left(g^{11}\right)^2g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{2}\left(g^{11}\right)^2g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}\\
&-\frac{1}{2}g^{11}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{11}\left(g^{33}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{11}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{2}\left(g^{22}\right)^2g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}\left(g^{22}\right)^2g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{2}\left(g^{22}\right)^2g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}g^{22}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{2}g^{22}\left(g^{33}\right)^2\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{2}g^{22}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{2}\left(g^{00}\right)^2g^{11}\left(\frac{\partial g_{00}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}\left(g^{11}\right)^2\left(\frac{\partial g_{11}}{\partial x^0}\right)^2+\frac{1}{2}\left(g^{00}\right)^2g^{22}\left(\frac{\partial g_{00}}{\partial x^2}\right)^2\\
&+\frac{1}{2}g^{00}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^0}\right)^2+\frac{1}{2}\left(g^{00}\right)^2g^{33}\left(\frac{\partial g_{00}}{\partial x^3}\right)^2+\frac{1}{2}\left(g^{11}\right)^2g^{22}\left(\frac{\partial g_{11}}{\partial x^2}\right)^2\\
&+\frac{1}{2}g^{11}\left(g^{22}\right)^2\left(\frac{\partial g_{22}}{\partial x^1}\right)^2+\frac{1}{2}g^{00}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^0}\right)^2+\frac{1}{2}\left(g^{11}\right)^2g^{33}\left(\frac{\partial g_{11}}{\partial x^3}\right)^2\\
&+\frac{1}{2}g^{11}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^1}\right)^2+\frac{1}{2}\left(g^{22}\right)^2g^{33}\left(\frac{\partial g_{22}}{\partial x^3}\right)^2+\frac{1}{2}g^{22}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^2}\right)^2
\end{aligned}
$$

3.2 G_{ij}

$$
G_{00} = +\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{3}{4}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2\\
&+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2-\frac{3}{4}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2\\
&+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2-\frac{3}{4}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2\\
&+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{11}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}\\
&-\left(g^{00}\right)^{-1}g^{11}g^{22}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{11}g^{22}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{11}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}\\
&-\left(g^{00}\right)^{-1}g^{11}g^{33}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{11}g^{33}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{22}g^{33}\frac{\partial^2 g_{33}}{\partial x^2\partial x^2}\\
&-\left(g^{00}\right)^{-1}g^{22}g^{33}\frac{\partial^2 g_{23}}{\partial x^2\partial x^3}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{22}g^{33}\frac{\partial^2 g_{22}}{\partial x^3\partial x^3}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}\\
&+\frac{1}{2}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2\\
&-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}g^{22}g^{33}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2-\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^2g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}\\
&+\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^2g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^2g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{22}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{22}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^2g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^2g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^2g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{33}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{22}\right)^2g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{22}\right)^2g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{22}\right)^2g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^{-1}g^{22}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{4}\left(g^{00}\right)^{-1}g^{22}\left(g^{33}\right)^2\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^{-1}g^{22}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^2g^{22}\left(\frac{\partial g_{11}}{\partial x^2}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{22}\right)^{2}\left(\frac{\partial g_{22}}{\partial x^{1}}\right)^{2}-\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{11}\right)^{2}g^{33}\left(\frac{\partial g_{11}}{\partial x^{3}}\right)^{2}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{11}\left(g^{33}\right)^{2}\left(\frac{\partial g_{33}}{\partial x^{1}}\right)^{2}\\
&-\frac{1}{4}\left(g^{00}\right)^{-1}\left(g^{22}\right)^{2}g^{33}\left(\frac{\partial g_{22}}{\partial x^{3}}\right)^{2}-\frac{1}{4}\left(g^{00}\right)^{-1}g^{22}\left(g^{33}\right)^{2}\left(\frac{\partial g_{33}}{\partial x^{2}}\right)^{2}
\end{aligned}
$$

$$
\begin{aligned}
G_{01} \;=\;& -\frac{1}{2}g^{22}\frac{\partial^{2}g_{22}}{\partial x^{0}\partial x^{1}}+\frac{1}{2}g^{22}\frac{\partial^{2}g_{12}}{\partial x^{0}\partial x^{2}}+\frac{1}{2}g^{22}\frac{\partial^{2}g_{02}}{\partial x^{1}\partial x^{2}}-\frac{1}{2}g^{22}\frac{\partial^{2}g_{01}}{\partial x^{2}\partial x^{2}}\\
&-\frac{1}{2}g^{33}\frac{\partial^{2}g_{33}}{\partial x^{0}\partial x^{1}}+\frac{1}{2}g^{33}\frac{\partial^{2}g_{13}}{\partial x^{0}\partial x^{3}}+\frac{1}{2}g^{33}\frac{\partial^{2}g_{03}}{\partial x^{1}\partial x^{3}}-\frac{1}{2}g^{33}\frac{\partial^{2}g_{01}}{\partial x^{3}\partial x^{3}}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{01}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{0}}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{0}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{02}}{\partial x^{1}}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{01}}{\partial x^{2}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{0}}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{13}}{\partial x^{0}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{03}}{\partial x^{1}}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{01}}{\partial x^{3}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{1}}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{12}}{\partial x^{1}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{11}}{\partial x^{2}}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{1}}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{11}}{\partial x^{2}}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{1}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{11}}{\partial x^{2}}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{1}}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{13}}{\partial x^{1}}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{11}}{\partial x^{3}}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{13}}{\partial x^{1}}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{11}}{\partial x^{3}}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{13}}{\partial x^{1}}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{11}}{\partial x^{3}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{2}}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{2}}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{2}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{3}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{3}}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{22}}{\partial x^{3}}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{0}}\frac{\partial g_{23}}{\partial x^{1}}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{3}}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^{3}}\frac{\partial g_{13}}{\partial x^{2}}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^{3}}\frac{\partial g_{12}}{\partial x^{3}}-\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{2}}-\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{2}}+\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{2}}\\
&+\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{1}}-\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{3}}-\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{3}}+\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{33}}{\partial x^{3}}\\
&+\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{33}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{1}}
\end{aligned}
$$

$$
\begin{aligned}
G_{02} \;=\;& +\frac{1}{2}g^{11}\frac{\partial^{2}g_{12}}{\partial x^{0}\partial x^{1}}-\frac{1}{2}g^{11}\frac{\partial^{2}g_{11}}{\partial x^{0}\partial x^{2}}-\frac{1}{2}g^{11}\frac{\partial^{2}g_{02}}{\partial x^{1}\partial x^{1}}+\frac{1}{2}g^{11}\frac{\partial^{2}g_{01}}{\partial x^{1}\partial x^{2}}\\
&-\frac{1}{2}g^{33}\frac{\partial^{2}g_{33}}{\partial x^{0}\partial x^{2}}+\frac{1}{2}g^{33}\frac{\partial^{2}g_{23}}{\partial x^{0}\partial x^{3}}+\frac{1}{2}g^{33}\frac{\partial^{2}g_{03}}{\partial x^{2}\partial x^{3}}-\frac{1}{2}g^{33}\frac{\partial^{2}g_{02}}{\partial x^{3}\partial x^{3}}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{0}}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{02}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{00}}{\partial x^{2}}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{02}}{\partial x^{2}}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{0}}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{0}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{03}}{\partial x^{2}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{02}}{\partial x^{3}}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{1}}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{12}}{\partial x^{2}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{1}}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{2}}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{1}}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{2}}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{11}}{\partial x^{2}}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{1}}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{1}}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{1}}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{13}}{\partial x^{2}}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{23}}{\partial x^{1}}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{3}}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{1}}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{12}}{\partial x^{3}}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^{0}}\frac{\partial g_{11}}{\partial x^{3}}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^{2}}\frac{\partial g_{11}}{\partial x^{3}}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{02}}{\partial x^{3}}\frac{\partial g_{11}}{\partial x^{3}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{2}}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{0}}\frac{\partial g_{23}}{\partial x^{2}}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{3}}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{3}}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{2}}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^{3}}\frac{\partial g_{22}}{\partial x^{3}}\\
&+\frac{1}{4}\left(g^{11}\right)^{2}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{11}}{\partial x^{2}}-\frac{1}{4}\left(g^{11}\right)^{2}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{11}}{\partial x^{1}}+\frac{1}{4}\left(g^{11}\right)^{2}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{11}}{\partial x^{1}}-\frac{1}{4}\left(g^{11}\right)^{2}\frac{\partial g_{11}}{\partial x^{1}}\frac{\partial g_{01}}{\partial x^{2}}
\end{aligned}
$$

$$-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}$$

$$\begin{aligned}
G_{03} \;=\;& +\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^0\partial x^1}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^0\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{03}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{01}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{22}\frac{\partial^2 g_{23}}{\partial x^0\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^0\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{03}}{\partial x^2\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{02}}{\partial x^2\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{00}}{\partial x^3}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{22}}{\partial x^2}
\end{aligned}$$

$$\begin{aligned}
G_{11} \;=\;& -\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{3}{4}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2\\
&+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{3}{4}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2\\
&-\frac{3}{4}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+\frac{1}{4}g^{22}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}
\end{aligned}$$

$$
\begin{aligned}
&-\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{12}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{2}}+\frac{1}{4}\left(g^{22}\right)^{2}\frac{\partial g_{22}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{2}}-\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{13}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{3}}\\
&+\frac{1}{4}\left(g^{33}\right)^{2}\frac{\partial g_{33}}{\partial x^{1}}\frac{\partial g_{13}}{\partial x^{3}}+\frac{1}{2}g^{00}\left(g^{11}\right)^{-1}g^{22}\frac{\partial^{2}g_{22}}{\partial x^{0}\partial x^{0}}-g^{00}\left(g^{11}\right)^{-1}g^{22}\frac{\partial^{2}g_{02}}{\partial x^{0}\partial x^{2}}\\
&+\frac{1}{2}g^{00}\left(g^{11}\right)^{-1}g^{22}\frac{\partial^{2}g_{00}}{\partial x^{2}\partial x^{2}}+\frac{1}{2}g^{00}\left(g^{11}\right)^{-1}g^{33}\frac{\partial^{2}g_{33}}{\partial x^{0}\partial x^{0}}-g^{00}\left(g^{11}\right)^{-1}g^{33}\frac{\partial^{2}g_{03}}{\partial x^{0}\partial x^{3}}\\
&+\frac{1}{2}g^{00}\left(g^{11}\right)^{-1}g^{33}\frac{\partial^{2}g_{00}}{\partial x^{3}\partial x^{3}}+\frac{1}{2}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial^{2}g_{33}}{\partial x^{2}\partial x^{2}}-\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial^{2}g_{23}}{\partial x^{2}\partial x^{3}}\\
&+\frac{1}{2}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial^{2}g_{22}}{\partial x^{3}\partial x^{3}}+\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{2}}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{23}}{\partial x^{3}}\\
&-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{2}}+\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{22}}{\partial x^{3}}+\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{0}}\\
&-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{3}}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{02}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{0}}+\frac{1}{2}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{2}}\\
&+\frac{1}{2}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{3}}+\frac{1}{2}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\frac{\partial g_{03}}{\partial x^{2}}\frac{\partial g_{02}}{\partial x^{3}}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\left(\frac{\partial g_{23}}{\partial x^{0}}\right)^{2}\\
&-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\left(\frac{\partial g_{03}}{\partial x^{2}}\right)^{2}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}g^{22}g^{33}\left(\frac{\partial g_{02}}{\partial x^{3}}\right)^{2}-\frac{1}{4}\left(g^{00}\right)^{2}\left(g^{11}\right)^{-1}g^{22}\frac{\partial g_{00}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{0}}\\
&+\frac{1}{4}\left(g^{00}\right)^{2}\left(g^{11}\right)^{-1}g^{22}\frac{\partial g_{00}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{2}}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}\left(g^{22}\right)^{2}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{2}}+\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}\left(g^{22}\right)^{2}\frac{\partial g_{22}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{2}}\\
&-\frac{1}{4}\left(g^{00}\right)^{2}\left(g^{11}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{0}}+\frac{1}{4}\left(g^{00}\right)^{2}\left(g^{11}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{3}}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}\left(g^{33}\right)^{2}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{33}}{\partial x^{3}}\\
&+\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}\left(g^{33}\right)^{2}\frac{\partial g_{33}}{\partial x^{0}}\frac{\partial g_{03}}{\partial x^{3}}-\frac{1}{4}\left(g^{11}\right)^{-1}\left(g^{22}\right)^{2}g^{33}\frac{\partial g_{22}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{2}}+\frac{1}{4}\left(g^{11}\right)^{-1}\left(g^{22}\right)^{2}g^{33}\frac{\partial g_{22}}{\partial x^{2}}\frac{\partial g_{23}}{\partial x^{3}}\\
&+\frac{1}{4}\left(g^{11}\right)^{-1}\left(g^{22}\right)^{2}g^{33}\frac{\partial g_{23}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{3}}+\frac{1}{4}\left(g^{11}\right)^{-1}g^{22}\left(g^{33}\right)^{2}\frac{\partial g_{23}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{3}}-\frac{1}{4}\left(g^{11}\right)^{-1}g^{22}\left(g^{33}\right)^{2}\frac{\partial g_{22}}{\partial x^{3}}\frac{\partial g_{33}}{\partial x^{3}}\\
&+\frac{1}{4}\left(g^{11}\right)^{-1}g^{22}\left(g^{33}\right)^{2}\frac{\partial g_{33}}{\partial x^{2}}\frac{\partial g_{23}}{\partial x^{3}}-\frac{1}{4}\left(g^{00}\right)^{2}\left(g^{11}\right)^{-1}g^{22}\left(\frac{\partial g_{00}}{\partial x^{2}}\right)^{2}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}\left(g^{22}\right)^{2}\left(\frac{\partial g_{22}}{\partial x^{0}}\right)^{2}\\
&-\frac{1}{4}\left(g^{00}\right)^{2}\left(g^{11}\right)^{-1}g^{33}\left(\frac{\partial g_{00}}{\partial x^{3}}\right)^{2}-\frac{1}{4}g^{00}\left(g^{11}\right)^{-1}\left(g^{33}\right)^{2}\left(\frac{\partial g_{33}}{\partial x^{0}}\right)^{2}-\frac{1}{4}\left(g^{11}\right)^{-1}\left(g^{22}\right)^{2}g^{33}\left(\frac{\partial g_{22}}{\partial x^{3}}\right)^{2}\\
&-\frac{1}{4}\left(g^{11}\right)^{-1}g^{22}\left(g^{33}\right)^{2}\left(\frac{\partial g_{33}}{\partial x^{2}}\right)^{2}
\end{aligned}
$$

$$
\begin{aligned}
G_{12} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^{2}g_{12}}{\partial x^{0}\partial x^{0}}+\frac{1}{2}g^{00}\frac{\partial^{2}g_{02}}{\partial x^{0}\partial x^{1}}+\frac{1}{2}g^{00}\frac{\partial^{2}g_{01}}{\partial x^{0}\partial x^{2}}-\frac{1}{2}g^{00}\frac{\partial^{2}g_{00}}{\partial x^{1}\partial x^{2}}\\
&-\frac{1}{2}g^{33}\frac{\partial^{2}g_{33}}{\partial x^{1}\partial x^{2}}+\frac{1}{2}g^{33}\frac{\partial^{2}g_{23}}{\partial x^{1}\partial x^{3}}+\frac{1}{2}g^{33}\frac{\partial^{2}g_{13}}{\partial x^{2}\partial x^{3}}-\frac{1}{2}g^{33}\frac{\partial^{2}g_{12}}{\partial x^{3}\partial x^{3}}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^{1}}\frac{\partial g_{11}}{\partial x^{2}}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{12}}{\partial x^{0}}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^{0}}\frac{\partial g_{01}}{\partial x^{2}}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{0}}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^{1}}\frac{\partial g_{02}}{\partial x^{1}}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^{1}}\frac{\partial g_{01}}{\partial x^{2}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{1}}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{22}}{\partial x^{0}}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{2}}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{0}}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{02}}{\partial x^{2}}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{22}}{\partial x^{0}}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{02}}{\partial x^{2}}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{12}}{\partial x^{0}}\frac{\partial g_{33}}{\partial x^{0}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^{1}}\frac{\partial g_{33}}{\partial x^{0}}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{0}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{1}}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{13}}{\partial x^{2}}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^{3}}\frac{\partial g_{12}}{\partial x^{3}}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{23}}{\partial x^{0}}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^{0}}\frac{\partial g_{02}}{\partial x^{3}}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^{1}}\frac{\partial g_{03}}{\partial x^{2}}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{23}}{\partial x^{0}}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^{3}}\frac{\partial g_{02}}{\partial x^{3}}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{1}}\frac{\partial g_{22}}{\partial x^{1}}-g^{11}g^{22}\frac{\partial g_{12}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{2}}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^{2}}\frac{\partial g_{12}}{\partial x^{2}}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^{2}}\frac{\partial g_{33}}{\partial x^{1}}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{1}}\frac{\partial g_{23}}{\partial x^{1}}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{1}}\frac{\partial g_{13}}{\partial x^{2}}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^{1}}\frac{\partial g_{12}}{\partial x^{3}}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^2}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}\\
&+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{12}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^2}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
G_{13} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^2 g_{13}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}\frac{\partial^2 g_{01}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^1\partial x^3}\\
&+\frac{1}{2}g^{22}\frac{\partial^2 g_{23}}{\partial x^1\partial x^2}-\frac{1}{2}g^{22}\frac{\partial^2 g_{22}}{\partial x^1\partial x^3}-\frac{1}{2}g^{22}\frac{\partial^2 g_{13}}{\partial x^2\partial x^2}+\frac{1}{2}g^{22}\frac{\partial^2 g_{12}}{\partial x^2\partial x^3}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}\\
&+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}\\
&+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{01}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{2}g^{22}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}\\
&+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
G_{22} \;=\;& +\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}\\
&-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}
\end{aligned}
$$

$$
\begin{aligned}
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}\\
&-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2\\
&-\frac{3}{4}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2-\frac{3}{4}g^{00}g^{33}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2\\
&+\frac{1}{4}g^{00}g^{33}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}g^{11}g^{33}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2-\frac{3}{4}g^{11}g^{33}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2\\
&-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}\\
&-\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\left(g^{22}\right)^{-1}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}\\
&-g^{00}g^{11}\left(g^{22}\right)^{-1}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}g^{11}\left(g^{22}\right)^{-1}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}+\frac{1}{2}g^{00}\left(g^{22}\right)^{-1}g^{33}\frac{\partial^2 g_{33}}{\partial x^0\partial x^0}\\
&-g^{00}\left(g^{22}\right)^{-1}g^{33}\frac{\partial^2 g_{03}}{\partial x^0\partial x^3}+\frac{1}{2}g^{00}\left(g^{22}\right)^{-1}g^{33}\frac{\partial^2 g_{00}}{\partial x^3\partial x^3}+\frac{1}{2}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial^2 g_{33}}{\partial x^1\partial x^1}\\
&-g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial^2 g_{13}}{\partial x^1\partial x^3}+\frac{1}{2}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial^2 g_{11}}{\partial x^3\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&-\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2-\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2-\frac{1}{4}g^{00}g^{11}\left(g^{22}\right)^{-1}g^{33}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2\\
&-\frac{1}{4}\left(g^{00}\right)^2g^{11}\left(g^{22}\right)^{-1}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}+\frac{1}{4}\left(g^{00}\right)^2g^{11}\left(g^{22}\right)^{-1}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}-\frac{1}{4}g^{00}\left(g^{11}\right)^2\left(g^{22}\right)^{-1}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}\\
&+\frac{1}{4}g^{00}\left(g^{11}\right)^2\left(g^{22}\right)^{-1}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}-\frac{1}{4}\left(g^{00}\right)^2\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{4}\left(g^{00}\right)^2\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{4}g^{00}\left(g^{22}\right)^{-1}\left(g^{33}\right)^2\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{00}\left(g^{22}\right)^{-1}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}\left(g^{11}\right)^2\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}\\
&+\frac{1}{4}\left(g^{11}\right)^2\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\left(g^{22}\right)^{-1}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}+\frac{1}{4}g^{11}\left(g^{22}\right)^{-1}\left(g^{33}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{4}g^{11}\left(g^{22}\right)^{-1}\left(g^{33}\right)^2\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^3}+\frac{1}{4}g^{11}\left(g^{22}\right)^{-1}\left(g^{33}\right)^2\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}-\frac{1}{4}\left(g^{00}\right)^2g^{11}\left(g^{22}\right)^{-1}\left(\frac{\partial g_{00}}{\partial x^1}\right)^2\\
&-\frac{1}{4}g^{00}\left(g^{11}\right)^2\left(g^{22}\right)^{-1}\left(\frac{\partial g_{11}}{\partial x^0}\right)^2-\frac{1}{4}\left(g^{00}\right)^2\left(g^{22}\right)^{-1}g^{33}\left(\frac{\partial g_{00}}{\partial x^3}\right)^2-\frac{1}{4}g^{00}\left(g^{22}\right)^{-1}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^0}\right)^2\\
&-\frac{1}{4}\left(g^{11}\right)^2\left(g^{22}\right)^{-1}g^{33}\left(\frac{\partial g_{11}}{\partial x^3}\right)^2-\frac{1}{4}g^{11}\left(g^{22}\right)^{-1}\left(g^{33}\right)^2\left(\frac{\partial g_{33}}{\partial x^1}\right)^2
\end{aligned}
$$

$$
\begin{aligned}
G_{23} \;=\;& -\frac{1}{2}g^{00}\frac{\partial^2 g_{23}}{\partial x^0\partial x^0}+\frac{1}{2}g^{00}\frac{\partial^2 g_{03}}{\partial x^0\partial x^2}+\frac{1}{2}g^{00}\frac{\partial^2 g_{02}}{\partial x^0\partial x^3}-\frac{1}{2}g^{00}\frac{\partial^2 g_{00}}{\partial x^2\partial x^3}\\
&-\frac{1}{2}g^{11}\frac{\partial^2 g_{23}}{\partial x^1\partial x^1}+\frac{1}{2}g^{11}\frac{\partial^2 g_{13}}{\partial x^1\partial x^2}+\frac{1}{2}g^{11}\frac{\partial^2 g_{12}}{\partial x^1\partial x^3}-\frac{1}{2}g^{11}\frac{\partial^2 g_{11}}{\partial x^2\partial x^3}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}\\
&+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{13}}{\partial x^0}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{13}}{\partial x^0}
\end{aligned}
$$

$$
\begin{aligned}
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{03}}{\partial x^1}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^2}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{23}}{\partial x^0}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{03}}{\partial x^2}\\
&-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{33}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{33}}{\partial x^0}+\frac{1}{2}g^{00}g^{33}\frac{\partial g_{02}}{\partial x^3}\frac{\partial g_{03}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{23}}{\partial x^1}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{2}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{33}}{\partial x^1}+\frac{1}{2}g^{11}g^{33}\frac{\partial g_{12}}{\partial x^3}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^2}-g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&+\frac{1}{2}g^{22}g^{33}\frac{\partial g_{22}}{\partial x^3}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{23}}{\partial x^0}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{00}}{\partial x^3}+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{23}}{\partial x^1}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{11}}{\partial x^3}
\end{aligned}
$$

$$
\begin{aligned}
G_{33} \quad = \quad &+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{33}}{\partial x^0}\\
&-\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{13}}{\partial x^1}+\frac{1}{4}g^{00}g^{11}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{2}g^{00}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{03}}{\partial x^1}\\
&+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{13}}{\partial x^0}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{2}g^{00}g^{11}\frac{\partial g_{03}}{\partial x^1}\frac{\partial g_{01}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{00}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{00}g^{22}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}\\
&-\frac{1}{4}g^{00}g^{22}\frac{\partial g_{02}}{\partial x^2}\frac{\partial g_{33}}{\partial x^0}-\frac{1}{2}g^{00}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{03}}{\partial x^2}+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{23}}{\partial x^0}\frac{\partial g_{02}}{\partial x^3}\\
&+\frac{1}{2}g^{00}g^{22}\frac{\partial g_{03}}{\partial x^2}\frac{\partial g_{02}}{\partial x^3}-\frac{1}{4}g^{00}g^{33}\frac{\partial g_{33}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{33}}{\partial x^2}\\
&+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{22}}{\partial x^3}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}\\
&-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{12}}{\partial x^2}\frac{\partial g_{33}}{\partial x^1}-\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{23}}{\partial x^2}+\frac{1}{4}g^{11}g^{22}\frac{\partial g_{11}}{\partial x^3}\frac{\partial g_{22}}{\partial x^3}\\
&-\frac{1}{2}g^{11}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{13}}{\partial x^2}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{23}}{\partial x^1}\frac{\partial g_{12}}{\partial x^3}+\frac{1}{2}g^{11}g^{22}\frac{\partial g_{13}}{\partial x^2}\frac{\partial g_{12}}{\partial x^3}\\
&+\frac{1}{4}g^{11}g^{33}\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{33}}{\partial x^3}-\frac{1}{4}g^{11}g^{33}\frac{\partial g_{33}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}+\frac{1}{4}g^{22}g^{33}\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{33}}{\partial x^3}\\
&-\frac{1}{4}g^{22}g^{33}\frac{\partial g_{33}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{13}}{\partial x^0}\right)^2+\frac{1}{4}g^{00}g^{11}\left(\frac{\partial g_{03}}{\partial x^1}\right)^2\\
&-\frac{3}{4}g^{00}g^{11}\left(\frac{\partial g_{01}}{\partial x^3}\right)^2+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{23}}{\partial x^0}\right)^2+\frac{1}{4}g^{00}g^{22}\left(\frac{\partial g_{03}}{\partial x^2}\right)^2\\
&-\frac{3}{4}g^{00}g^{22}\left(\frac{\partial g_{02}}{\partial x^3}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{23}}{\partial x^1}\right)^2+\frac{1}{4}g^{11}g^{22}\left(\frac{\partial g_{13}}{\partial x^2}\right)^2\\
&-\frac{3}{4}g^{11}g^{22}\left(\frac{\partial g_{12}}{\partial x^3}\right)^2-\frac{1}{4}\left(g^{00}\right)^2\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{03}}{\partial x^3}-\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{13}}{\partial x^3}\\
&+\frac{1}{4}\left(g^{11}\right)^2\frac{\partial g_{13}}{\partial x^1}\frac{\partial g_{11}}{\partial x^3}-\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{22}}{\partial x^2}\frac{\partial g_{23}}{\partial x^3}+\frac{1}{4}\left(g^{22}\right)^2\frac{\partial g_{23}}{\partial x^2}\frac{\partial g_{22}}{\partial x^3}
\end{aligned}
$$

$$+\frac{1}{2}g^{00}g^{11}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{11}}{\partial x^0\partial x^0}-g^{00}g^{11}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{01}}{\partial x^0\partial x^1}+\frac{1}{2}g^{00}g^{11}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{00}}{\partial x^1\partial x^1}$$
$$+\frac{1}{2}g^{00}g^{22}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{22}}{\partial x^0\partial x^0}-g^{00}g^{22}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{02}}{\partial x^0\partial x^2}+\frac{1}{2}g^{00}g^{22}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{00}}{\partial x^2\partial x^2}$$
$$+\frac{1}{2}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{22}}{\partial x^1\partial x^1}-g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{12}}{\partial x^1\partial x^2}+\frac{1}{2}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial^2 g_{11}}{\partial x^2\partial x^2}$$
$$+\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}-\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$-\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{01}}{\partial x^1}\frac{\partial g_{22}}{\partial x^0}-\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{12}}{\partial x^1}$$
$$+\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{11}}{\partial x^2}+\frac{1}{2}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{02}}{\partial x^1}+\frac{1}{2}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{12}}{\partial x^0}\frac{\partial g_{01}}{\partial x^2}$$
$$+\frac{1}{2}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{02}}{\partial x^1}\frac{\partial g_{01}}{\partial x^2}-\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\left(\frac{\partial g_{12}}{\partial x^0}\right)^2-\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\left(\frac{\partial g_{02}}{\partial x^1}\right)^2$$
$$-\frac{1}{4}g^{00}g^{11}g^{22}\left(g^{33}\right)^{-1}\left(\frac{\partial g_{01}}{\partial x^2}\right)^2-\frac{1}{4}\left(g^{00}\right)^2g^{11}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{11}}{\partial x^0}+\frac{1}{4}\left(g^{00}\right)^2g^{11}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}$$
$$-\frac{1}{4}g^{00}\left(g^{11}\right)^2\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^1}\frac{\partial g_{11}}{\partial x^1}+\frac{1}{4}g^{00}\left(g^{11}\right)^2\left(g^{33}\right)^{-1}\frac{\partial g_{11}}{\partial x^0}\frac{\partial g_{01}}{\partial x^1}-\frac{1}{4}\left(g^{00}\right)^2g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{22}}{\partial x^0}$$
$$+\frac{1}{4}\left(g^{00}\right)^2g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}-\frac{1}{4}g^{00}\left(g^{22}\right)^2\left(g^{33}\right)^{-1}\frac{\partial g_{00}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{00}\left(g^{22}\right)^2\left(g^{33}\right)^{-1}\frac{\partial g_{22}}{\partial x^0}\frac{\partial g_{02}}{\partial x^2}$$
$$-\frac{1}{4}\left(g^{11}\right)^2g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{22}}{\partial x^1}+\frac{1}{4}\left(g^{11}\right)^2g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{11}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}+\frac{1}{4}\left(g^{11}\right)^2g^{22}\left(g^{33}\right)^{-1}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{11}}{\partial x^2}$$
$$+\frac{1}{4}g^{11}\left(g^{22}\right)^2\left(g^{33}\right)^{-1}\frac{\partial g_{12}}{\partial x^1}\frac{\partial g_{22}}{\partial x^2}-\frac{1}{4}g^{11}\left(g^{22}\right)^2\left(g^{33}\right)^{-1}\frac{\partial g_{11}}{\partial x^2}\frac{\partial g_{22}}{\partial x^2}+\frac{1}{4}g^{11}\left(g^{22}\right)^2\left(g^{33}\right)^{-1}\frac{\partial g_{22}}{\partial x^1}\frac{\partial g_{12}}{\partial x^2}$$
$$-\frac{1}{4}\left(g^{00}\right)^2g^{11}\left(g^{33}\right)^{-1}\left(\frac{\partial g_{00}}{\partial x^1}\right)^2-\frac{1}{4}g^{00}\left(g^{11}\right)^2\left(g^{33}\right)^{-1}\left(\frac{\partial g_{11}}{\partial x^0}\right)^2-\frac{1}{4}\left(g^{00}\right)^2g^{22}\left(g^{33}\right)^{-1}\left(\frac{\partial g_{00}}{\partial x^2}\right)^2$$
$$-\frac{1}{4}g^{00}\left(g^{22}\right)^2\left(g^{33}\right)^{-1}\left(\frac{\partial g_{22}}{\partial x^0}\right)^2-\frac{1}{4}\left(g^{11}\right)^2g^{22}\left(g^{33}\right)^{-1}\left(\frac{\partial g_{11}}{\partial x^2}\right)^2-\frac{1}{4}g^{11}\left(g^{22}\right)^2\left(g^{33}\right)^{-1}\left(\frac{\partial g_{22}}{\partial x^1}\right)^2$$