

# Weyl Tensor Simplifications v8 Matthew

## Direct Output, No Simplification

$$W_{\mu\nu} = -\frac{1}{6}g_{\mu\nu}R^2 + \frac{1}{2}g_{\mu\nu}R_{\alpha\beta}R^{\alpha\beta} + \frac{2}{3}RR_{\mu\nu} - R^{\alpha\beta}R_{\beta\mu\alpha\nu} - R^{\alpha\beta}R_{\beta\nu\alpha\mu} - \frac{1}{6}g_{\mu\nu}\nabla_\alpha\nabla^\alpha R + \nabla_\alpha\nabla^\alpha R_{\mu\nu} - \frac{1}{3}\nabla_\nu\nabla_\mu R$$

62 Terms

$$\begin{aligned} \delta W_{\mu\nu}(h_{\mu\nu}) = & -\frac{1}{6}h_{\mu\nu}R^2 + \frac{1}{3}g_{\mu\nu}h^{\alpha\beta}RR_{\alpha\beta} + \frac{1}{2}h_{\mu\nu}R_{\alpha\beta}R^{\alpha\beta} - g_{\mu\nu}h^{\alpha\beta}R_{\alpha}{}^{\gamma}R_{\beta\gamma} - \frac{2}{3}h^{\alpha\beta}R_{\alpha\beta}R_{\mu\nu} \\ & + h^{\alpha\beta}R_{\alpha}{}^{\gamma}R_{\mu\beta\nu\gamma} + h^{\alpha\beta}R_{\alpha}{}^{\gamma}R_{\mu\gamma\nu\beta} - \frac{1}{6}h_{\mu\nu}\nabla_\alpha\nabla^\alpha R + \frac{1}{6}g_{\mu\nu}h^{\alpha\beta}\nabla_\beta\nabla_\alpha R \\ & - h^{\alpha\beta}\nabla_\beta\nabla_\alpha R_{\mu\nu} + \frac{1}{6}g_{\mu\nu}h^{\alpha\beta}\nabla_\gamma\nabla^\gamma R_{\alpha\beta} + \frac{1}{3}h^{\alpha\beta}\nabla_\nu\nabla_\mu R_{\alpha\beta} \\ & + \frac{1}{3}R\nabla_\alpha\nabla^\alpha h_{\mu\nu} + R_{\mu\beta\nu\gamma}\nabla_\alpha\nabla^\gamma h^{\alpha\beta} + R_{\mu\gamma\nu\beta}\nabla_\alpha\nabla^\gamma h^{\alpha\beta} - \frac{1}{3}R\nabla_\alpha\nabla_\mu h_\nu{}^\alpha - \frac{1}{3}R\nabla_\alpha\nabla_\nu h_\mu{}^\alpha \\ & - \frac{1}{6}\nabla_\alpha h_{\mu\nu}\nabla^\alpha R + \frac{1}{6}g_{\mu\nu}\nabla^\alpha R\nabla_\beta h_\alpha{}^\beta - \nabla_\alpha h^{\alpha\beta}\nabla_\beta R_{\mu\nu} + \frac{1}{3}g_{\mu\nu}R\nabla_\beta\nabla_\alpha h^{\alpha\beta} \\ & - \frac{2}{3}R_{\mu\nu}\nabla_\beta\nabla_\alpha h^{\alpha\beta} + \frac{1}{2}R_\nu{}^\alpha\nabla_\beta\nabla_\alpha h_\mu{}^\beta - R^{\alpha\beta}\nabla_\beta\nabla_\alpha h_{\mu\nu} + \frac{1}{2}R_\mu{}^\alpha\nabla_\beta\nabla_\alpha h_\nu{}^\beta \\ & - \frac{1}{2}R_\nu{}^\alpha\nabla_\beta\nabla^\beta h_{\mu\alpha} - \frac{1}{2}R_\mu{}^\alpha\nabla_\beta\nabla^\beta h_{\nu\alpha} + \frac{1}{2}\nabla_\beta\nabla^\beta\nabla_\alpha\nabla^\alpha h_{\mu\nu} - \frac{1}{2}\nabla_\beta\nabla^\beta\nabla_\alpha\nabla_\mu h_\nu{}^\alpha \\ & - \frac{1}{2}\nabla_\beta\nabla^\beta\nabla_\alpha\nabla_\nu h_\mu{}^\alpha - \frac{1}{2}R_\nu{}^\alpha\nabla_\beta\nabla_\mu h_\alpha{}^\beta + R^{\alpha\beta}\nabla_\beta\nabla_\mu h_{\nu\alpha} - \frac{1}{2}R_\mu{}^\alpha\nabla_\beta\nabla_\nu h_\alpha{}^\beta \\ & + R^{\alpha\beta}\nabla_\beta\nabla_\nu h_{\mu\alpha} + \nabla_\alpha R_{\nu\beta}\nabla^\beta h_\mu{}^\alpha - \nabla_\beta R_{\nu\alpha}\nabla^\beta h_\mu{}^\alpha + \nabla_\alpha R_{\mu\beta}\nabla^\beta h_\nu{}^\alpha - \nabla_\beta R_{\mu\alpha}\nabla^\beta h_\nu{}^\alpha \\ & - g_{\mu\nu}R^{\alpha\beta}\nabla_\gamma\nabla_\beta h_\alpha{}^\gamma + \frac{2}{3}g_{\mu\nu}R^{\alpha\beta}\nabla_\gamma\nabla^\gamma h_{\alpha\beta} - R_{\mu\alpha\nu\beta}\nabla_\gamma\nabla^\gamma h^{\alpha\beta} + \frac{1}{6}g_{\mu\nu}\nabla_\gamma\nabla^\gamma\nabla_\beta\nabla_\alpha h^{\alpha\beta} \\ & + \frac{1}{3}g_{\mu\nu}\nabla_\gamma R_{\alpha\beta}\nabla^\gamma h^{\alpha\beta} - \nabla_\beta R_{\nu\alpha}\nabla_\mu h^{\alpha\beta} + \frac{1}{6}\nabla^\alpha R\nabla_\mu h_{\nu\alpha} - \frac{1}{2}R^{\alpha\beta}\nabla_\mu\nabla_\nu h_{\alpha\beta} \\ & - \nabla_\beta R_{\mu\alpha}\nabla_\nu h^{\alpha\beta} + \frac{1}{3}\nabla_\mu R_{\alpha\beta}\nabla_\nu h^{\alpha\beta} + \frac{1}{6}\nabla^\alpha R\nabla_\nu h_{\mu\alpha} + \frac{1}{3}\nabla_\mu h^{\alpha\beta}\nabla_\nu R_{\alpha\beta} \\ & - \frac{1}{6}R^{\alpha\beta}\nabla_\nu\nabla_\mu h_{\alpha\beta} + \frac{1}{3}\nabla_\nu\nabla_\mu\nabla_\beta\nabla_\alpha h^{\alpha\beta} \\ & - \frac{1}{3}g_{\mu\nu}R\nabla_\alpha\nabla^\alpha h + \frac{2}{3}R_{\mu\nu}\nabla_\alpha\nabla^\alpha h + \frac{1}{2}\nabla_\alpha\nabla^\alpha\nabla_\nu\nabla_\mu h - \frac{1}{12}g_{\mu\nu}\nabla_\alpha h\nabla^\alpha R \\ & + \frac{1}{2}\nabla_\alpha R_{\mu\nu}\nabla^\alpha h + \frac{1}{2}g_{\mu\nu}R^{\alpha\beta}\nabla_\beta\nabla_\alpha h - \frac{1}{6}g_{\mu\nu}\nabla_\beta\nabla^\beta\nabla_\alpha\nabla^\alpha h - R_{\mu\alpha\nu\beta}\nabla^\beta\nabla^\alpha h \\ & + \frac{1}{3}R\nabla_\nu\nabla_\mu h - \frac{1}{3}\nabla_\nu\nabla_\mu\nabla_\alpha\nabla^\alpha h. \end{aligned} \tag{1}$$

Substituting  $h_{\mu\nu} = K_{\mu\nu} + \frac{h}{4}g_{\mu\nu}^{(0)}$

71 Terms

$$\begin{aligned}
\delta W_{\mu\nu}(K_{\mu\nu}) = & -\frac{1}{6}K_{\mu\nu}R^2 + \frac{1}{3}g_{\mu\nu}K_{\alpha\beta}RR^{\alpha\beta} + \frac{1}{2}K_{\mu\nu}R_{\alpha\beta}R^{\alpha\beta} - g_{\mu\nu}K_{\alpha\beta}R^\alpha{}_\gamma R^{\beta\gamma} - \frac{2}{3}K_{\alpha\beta}R^{\alpha\beta}R_{\mu\nu} \\
& + K_{\alpha\beta}R^\alpha{}_\gamma R_{\mu}{}^\beta{}_\nu{}^\gamma + K_{\alpha\beta}R^\alpha{}_\gamma R_{\mu}{}^\gamma{}_\nu{}^\beta - \frac{1}{6}K_{\mu\nu}\nabla_\alpha\nabla^\alpha R + \frac{1}{6}g_{\mu\nu}K_{\alpha\beta}\nabla^\beta\nabla^\alpha R \\
& - K_{\alpha\beta}\nabla^\beta\nabla^\alpha R_{\mu\nu} + \frac{1}{6}g_{\mu\nu}K_{\alpha\beta}\nabla_\gamma\nabla^\gamma R^{\alpha\beta} + \frac{1}{3}K_{\alpha\beta}\nabla_\nu\nabla_\mu R^{\alpha\beta} \\
& + \frac{1}{3}R\nabla_\alpha\nabla^\alpha K_{\mu\nu} + R_{\mu\beta\nu\gamma}\nabla_\alpha\nabla^\gamma K^{\alpha\beta} + R_{\mu\gamma\nu\beta}\nabla_\alpha\nabla^\gamma K^{\alpha\beta} - \frac{1}{3}R\nabla_\alpha\nabla_\mu K_\nu{}^\alpha \\
& - \frac{1}{3}R\nabla_\alpha\nabla_\nu K_\mu{}^\alpha - \frac{1}{6}\nabla_\alpha R\nabla^\alpha K_{\mu\nu} + \frac{1}{6}g_{\mu\nu}\nabla_\alpha R\nabla_\beta K^{\alpha\beta} + \nabla_\alpha R_{\nu}{}^\beta\nabla_\beta K_\mu{}^\alpha \\
& + \nabla_\alpha R_{\mu}{}^\beta\nabla_\beta K_\nu{}^\alpha - \nabla_\alpha K^{\alpha\beta}\nabla_\beta R_{\mu\nu} + \frac{1}{3}g_{\mu\nu}R\nabla_\beta\nabla_\alpha K^{\alpha\beta} - \frac{2}{3}R_{\mu\nu}\nabla_\beta\nabla_\alpha K^{\alpha\beta} \\
& + \frac{1}{2}R_{\nu\alpha}\nabla_\beta\nabla^\alpha K_\mu{}^\beta + \frac{1}{2}R_{\mu\alpha}\nabla_\beta\nabla^\alpha K_\nu{}^\beta - \frac{1}{2}R_{\nu\alpha}\nabla_\beta\nabla^\beta K_\mu{}^\alpha - \frac{1}{2}R_{\mu\alpha}\nabla_\beta\nabla^\beta K_\nu{}^\alpha \\
& + \frac{1}{2}\nabla_\beta\nabla^\beta\nabla_\alpha\nabla^\alpha K_{\mu\nu} - \frac{1}{2}\nabla_\beta\nabla^\beta\nabla_\alpha\nabla_\mu K_\nu{}^\alpha - \frac{1}{2}\nabla_\beta\nabla^\beta\nabla_\alpha\nabla_\nu K_\mu{}^\alpha - \frac{1}{2}R_{\nu\alpha}\nabla_\beta\nabla_\mu K^{\alpha\beta} \\
& - \frac{1}{2}R_{\mu\alpha}\nabla_\beta\nabla_\nu K^{\alpha\beta} - \nabla_\beta K_\nu{}^\alpha\nabla^\beta R_{\mu\alpha} - \nabla_\beta K_\mu{}^\alpha\nabla^\beta R_{\nu\alpha} - R_{\alpha\beta}\nabla^\beta\nabla^\alpha K_{\mu\nu} \\
& + R_{\alpha\beta}\nabla^\beta\nabla_\mu K_\nu{}^\alpha + R_{\alpha\beta}\nabla^\beta\nabla_\nu K_\mu{}^\alpha - g_{\mu\nu}R_{\alpha\beta}\nabla_\gamma\nabla^\beta K^{\alpha\gamma} + \frac{2}{3}g_{\mu\nu}R_{\alpha\beta}\nabla_\gamma\nabla^\gamma K^{\alpha\beta} \\
& - R_{\mu\alpha\nu\beta}\nabla_\gamma\nabla^\gamma K^{\alpha\beta} + \frac{1}{6}g_{\mu\nu}\nabla_\gamma\nabla^\gamma\nabla_\beta\nabla_\alpha K^{\alpha\beta} + \frac{1}{3}g_{\mu\nu}\nabla_\gamma K^{\alpha\beta}\nabla^\gamma R_{\alpha\beta} - \nabla_\beta R_{\nu\alpha}\nabla_\mu K^{\alpha\beta} \\
& + \frac{1}{6}\nabla_\alpha R\nabla_\mu K_\nu{}^\alpha - \frac{1}{2}R_{\alpha\beta}\nabla_\mu\nabla_\nu K^{\alpha\beta} + \frac{1}{3}\nabla_\mu R^{\alpha\beta}\nabla_\nu K_{\alpha\beta} - \nabla_\beta R_{\mu\alpha}\nabla_\nu K^{\alpha\beta} \\
& + \frac{1}{6}\nabla_\alpha R\nabla_\nu K_\mu{}^\alpha + \frac{1}{3}\nabla_\mu K^{\alpha\beta}\nabla_\nu R_{\alpha\beta} - \frac{1}{6}R_{\alpha\beta}\nabla_\nu\nabla_\mu K^{\alpha\beta} + \frac{1}{3}\nabla_\nu\nabla_\mu\nabla_\beta\nabla_\alpha K^{\alpha\beta} \\
& + \frac{1}{24}g_{\mu\nu}R^2h - \frac{1}{8}g_{\mu\nu}R_{\alpha\beta}R^{\alpha\beta}h - \frac{1}{6}RR_{\mu\nu}h + \frac{1}{2}R_{\alpha\beta}R_{\mu}{}^\alpha{}_\nu{}^\beta h + \frac{1}{24}g_{\mu\nu}h\nabla_\alpha\nabla^\alpha R \\
& - \frac{1}{4}h\nabla_\alpha\nabla^\alpha R_{\mu\nu} + \frac{1}{4}\nabla_\alpha\nabla^\alpha\nabla_\nu\nabla_\mu h - \frac{1}{4}\nabla_\alpha h\nabla^\alpha R_{\mu\nu} - \frac{1}{2}R_{\mu\alpha\nu}{}^\beta\nabla_\beta\nabla^\alpha h + \frac{1}{4}\nabla_\alpha h\nabla_\mu R_{\nu}{}^\alpha \\
& - \frac{1}{4}\nabla_\alpha R_{\nu}{}^\alpha\nabla_\mu h + \frac{1}{4}R_{\nu\alpha}\nabla_\mu\nabla^\alpha h + \frac{1}{8}\nabla_\mu h\nabla_\nu R + \frac{1}{4}\nabla_\alpha h\nabla_\nu R_{\mu}{}^\alpha - \frac{1}{4}\nabla_\alpha R_{\mu}{}^\alpha\nabla_\nu h \\
& + \frac{1}{8}\nabla_\mu R\nabla_\nu h + \frac{1}{4}R_{\mu\alpha}\nabla_\nu\nabla^\alpha h + \frac{1}{12}h\nabla_\nu\nabla_\mu R - \frac{1}{4}\nabla_\nu\nabla_\mu\nabla_\alpha\nabla^\alpha h.
\end{aligned} \tag{2}$$

## Weyl Tensor (General)

$$C_{\lambda\mu\nu\kappa} = \frac{1}{6}(g_{\lambda\nu}g_{\mu\kappa} - g_{\lambda\kappa}g_{\mu\nu})R + \frac{1}{2}(g_{\mu\nu}R_{\lambda\kappa} - g_{\mu\kappa}R_{\lambda\nu} - g_{\lambda\nu}R_{\mu\kappa} + g_{\lambda\kappa}R_{\mu\nu}) + R_{\lambda\mu\nu\kappa} \tag{3}$$

$$\begin{aligned}
\delta C_{\lambda\mu\nu\kappa}(h_{\mu\nu}) = & -\frac{1}{6}g_{\mu\nu}h_{\kappa\lambda}R + \frac{1}{6}g_{\lambda\nu}h_{\kappa\mu}R + \frac{1}{6}g_{\kappa\mu}h_{\lambda\nu}R - \frac{1}{6}g_{\kappa\lambda}h_{\mu\nu}R - \frac{1}{6}g_{\kappa\mu}g_{\lambda\nu}h^{\alpha\beta}R_{\alpha\beta} \\
& + \frac{1}{6}g_{\kappa\lambda}g_{\mu\nu}h^{\alpha\beta}R_{\alpha\beta} + \frac{1}{2}h_{\mu\nu}R_{\kappa\lambda} - \frac{1}{2}h_{\lambda\nu}R_{\kappa\mu} - \frac{1}{2}h_{\kappa\mu}R_{\lambda\nu} + \frac{1}{2}h_{\kappa\lambda}R_{\mu\nu} + h_{\lambda}{}^\alpha R_{\kappa\nu\mu\alpha} \\
& + \frac{1}{4}g_{\mu\nu}\nabla_\alpha\nabla^\alpha h_{\kappa\lambda} - \frac{1}{4}g_{\lambda\nu}\nabla_\alpha\nabla^\alpha h_{\kappa\mu} - \frac{1}{4}g_{\kappa\mu}\nabla_\alpha\nabla^\alpha h_{\lambda\nu} + \frac{1}{4}g_{\kappa\lambda}\nabla_\alpha\nabla^\alpha h_{\mu\nu} \\
& - \frac{1}{4}g_{\mu\nu}\nabla_\alpha\nabla_\kappa h_{\lambda}{}^\alpha + \frac{1}{4}g_{\lambda\nu}\nabla_\alpha\nabla_\kappa h_{\mu}{}^\alpha - \frac{1}{4}g_{\mu\nu}\nabla_\alpha\nabla_\lambda h_{\kappa}{}^\alpha + \frac{1}{4}g_{\kappa\mu}\nabla_\alpha\nabla_\lambda h_{\nu}{}^\alpha \\
& + \frac{1}{4}g_{\lambda\nu}\nabla_\alpha\nabla_\mu h_{\kappa}{}^\alpha - \frac{1}{4}g_{\kappa\lambda}\nabla_\alpha\nabla_\mu h_{\nu}{}^\alpha + \frac{1}{4}g_{\kappa\mu}\nabla_\alpha\nabla_\nu h_{\lambda}{}^\alpha - \frac{1}{4}g_{\kappa\lambda}\nabla_\alpha\nabla_\nu h_{\mu}{}^\alpha \\
& - \frac{1}{6}g_{\kappa\mu}g_{\lambda\nu}\nabla_\beta\nabla_\alpha h^{\alpha\beta} + \frac{1}{6}g_{\kappa\lambda}g_{\mu\nu}\nabla_\beta\nabla_\alpha h^{\alpha\beta} - \frac{1}{2}\nabla_\kappa\nabla_\lambda h_{\mu\nu} + \frac{1}{2}\nabla_\kappa\nabla_\mu h_{\lambda\nu} + \frac{1}{2}\nabla_\kappa\nabla_\nu h_{\lambda\mu} \\
& - \frac{1}{2}\nabla_\nu\nabla_\kappa h_{\lambda\mu} + \frac{1}{2}\nabla_\nu\nabla_\lambda h_{\kappa\mu} - \frac{1}{2}\nabla_\nu\nabla_\mu h_{\kappa\lambda} \\
& + \frac{1}{6}g_{\kappa\mu}g_{\lambda\nu}\nabla_\alpha\nabla^\alpha h - \frac{1}{6}g_{\kappa\lambda}g_{\mu\nu}\nabla_\alpha\nabla^\alpha h + \frac{1}{4}g_{\mu\nu}\nabla_\lambda\nabla_\kappa h - \frac{1}{4}g_{\lambda\nu}\nabla_\mu\nabla_\kappa h - \frac{1}{4}g_{\kappa\mu}\nabla_\nu\nabla_\lambda h \\
& + \frac{1}{4}g_{\kappa\lambda}\nabla_\nu\nabla_\mu h.
\end{aligned} \tag{4}$$

$$\begin{aligned}
\delta C_{\lambda\mu\nu\kappa}(K_{\mu\nu} + \frac{h}{4}g_{\mu\nu}) = & -\frac{1}{6}g_{\mu\nu}K_{\kappa\lambda}R + \frac{1}{6}g_{\lambda\nu}K_{\kappa\mu}R + \frac{1}{6}g_{\kappa\mu}K_{\lambda\nu}R - \frac{1}{6}g_{\kappa\lambda}K_{\mu\nu}R - \frac{1}{6}g_{\kappa\mu}g_{\lambda\nu}K^{\alpha\beta}R_{\alpha\beta} \\
& + \frac{1}{6}g_{\kappa\lambda}g_{\mu\nu}K^{\alpha\beta}R_{\alpha\beta} + \frac{1}{2}K_{\mu\nu}R_{\kappa\lambda} - \frac{1}{2}K_{\lambda\nu}R_{\kappa\mu} - \frac{1}{2}K_{\kappa\mu}R_{\lambda\nu} + \frac{1}{2}K_{\kappa\lambda}R_{\mu\nu} + K_{\lambda}{}^{\alpha}R_{\kappa\nu\mu\alpha} \\
& + \frac{1}{4}g_{\mu\nu}\nabla_{\alpha}\nabla^{\alpha}K_{\kappa\lambda} - \frac{1}{4}g_{\lambda\nu}\nabla_{\alpha}\nabla^{\alpha}K_{\kappa\mu} - \frac{1}{4}g_{\kappa\mu}\nabla_{\alpha}\nabla^{\alpha}K_{\lambda\nu} + \frac{1}{4}g_{\kappa\lambda}\nabla_{\alpha}\nabla^{\alpha}K_{\mu\nu} \\
& - \frac{1}{4}g_{\mu\nu}\nabla_{\alpha}\nabla_{\kappa}K_{\lambda}{}^{\alpha} + \frac{1}{4}g_{\lambda\nu}\nabla_{\alpha}\nabla_{\kappa}K_{\mu}{}^{\alpha} - \frac{1}{4}g_{\mu\nu}\nabla_{\alpha}\nabla_{\lambda}K_{\kappa}{}^{\alpha} + \frac{1}{4}g_{\kappa\mu}\nabla_{\alpha}\nabla_{\lambda}K_{\nu}{}^{\alpha} \\
& + \frac{1}{4}g_{\lambda\nu}\nabla_{\alpha}\nabla_{\mu}K_{\kappa}{}^{\alpha} - \frac{1}{4}g_{\kappa\lambda}\nabla_{\alpha}\nabla_{\mu}K_{\nu}{}^{\alpha} + \frac{1}{4}g_{\kappa\mu}\nabla_{\alpha}\nabla_{\nu}K_{\lambda}{}^{\alpha} - \frac{1}{4}g_{\kappa\lambda}\nabla_{\alpha}\nabla_{\nu}K_{\mu}{}^{\alpha} \\
& - \frac{1}{6}g_{\kappa\mu}g_{\lambda\nu}\nabla_{\beta}\nabla_{\alpha}K^{\alpha\beta} + \frac{1}{6}g_{\kappa\lambda}g_{\mu\nu}\nabla_{\beta}\nabla_{\alpha}K^{\alpha\beta} - \frac{1}{2}\nabla_{\kappa}\nabla_{\lambda}K_{\mu\nu} + \frac{1}{2}\nabla_{\kappa}\nabla_{\mu}K_{\lambda\nu} \\
& + \frac{1}{2}\nabla_{\kappa}\nabla_{\nu}K_{\lambda\mu} - \frac{1}{2}\nabla_{\nu}\nabla_{\kappa}K_{\lambda\mu} + \frac{1}{2}\nabla_{\nu}\nabla_{\lambda}K_{\kappa\mu} - \frac{1}{2}\nabla_{\nu}\nabla_{\mu}K_{\kappa\lambda} \\
& + \frac{1}{24}g_{\kappa\mu}g_{\lambda\nu}Rh - \frac{1}{24}g_{\kappa\lambda}g_{\mu\nu}Rh + \frac{1}{8}g_{\mu\nu}R_{\kappa\lambda}h - \frac{1}{8}g_{\lambda\nu}R_{\kappa\mu}h - \frac{1}{8}g_{\kappa\mu}R_{\lambda\nu}h + \frac{1}{8}g_{\kappa\lambda}R_{\mu\nu}h \\
& - \frac{1}{4}R_{\kappa\nu\lambda\mu}h.
\end{aligned} \tag{5}$$

$$\delta C_{\lambda\mu\nu\kappa}(\frac{h}{4}g_{\mu\nu}) = \frac{1}{4}hC_{\lambda\mu\nu\kappa} \tag{6}$$