

Schwarz 8.6

$$g_{\mu\nu} = \eta_{\mu\nu} + h_{\mu\nu}$$

$$\Rightarrow g^{\mu\nu} = \eta^{\mu\nu} + \delta g^{\mu\nu}$$

By 8.4,  $(g_{\mu\nu})^{-1} = (\eta_{\mu\nu} + h_{\mu\nu})^{-1}$

$$g^{\mu\nu} = \eta^{\mu\nu} - h^{\mu\nu} + \mathcal{O}(h^2)$$

$$\Rightarrow \boxed{\delta g^{\mu\nu} = -h^{\mu\nu} + \mathcal{O}(h^2)}$$

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