Anexo

Equações de "Die formale Grundlage der allgemeinen Relativitätstheorie" (O fundamento formal da teoria de relatividade geral, A. Einstein, Atas XLI, 1066-1077, 1914), que são citadas neste artigo pela ordem aqui apresentada.

(77):

$$S_{\sigma}^{\nu} = \sum_{\mu\tau} \left(g^{\nu\tau} \frac{\partial H\sqrt{-g}}{\partial g^{\sigma\nu}} + g_{\mu}^{\nu\tau} \frac{\partial H\sqrt{-g}}{\partial g_{\mu}^{\sigma\tau}} + \frac{1}{2}\delta_{\sigma}^{\nu} H\sqrt{-g} - \frac{1}{2} g_{\sigma}^{\mu\tau} \frac{\partial H\sqrt{-g}}{\partial g_{\nu}^{\mu\tau}} \right) \equiv 0$$

(78):

$$H = \frac{1}{4} \sum_{\alpha\beta\tau\varrho} g^{\alpha\beta} \frac{\partial g_{\tau\varrho}}{\partial x_{\alpha}} \frac{\partial g^{\tau\varrho}}{\partial x_{\beta}}$$

(17):

$$\sqrt{g} d\tau = d\tau_0^*, \;\; \text{onde } |g_{\mu\nu}| = g, \;\; d\tau_0^* = \int dx_1 dx_2 dx_3 dx_4$$

(19):

$$G_{iklm} = \sqrt{g}\delta_{iklm}$$

(21a):

$$G^{iklm} = \frac{1}{\sqrt{g}} \delta_{iklm}$$

(29):

$$A_{\alpha_1 \ldots \alpha_l s} = \frac{\partial A_{\alpha_1 \ldots \alpha_l}}{\partial x_s} - \sum_{\tau} \left[\begin{Bmatrix} \alpha_1 \, s \\ \tau \end{Bmatrix} A_{\tau\alpha_2 \ldots \alpha_l} + \begin{Bmatrix} \alpha_2 \, s \\ \tau \end{Bmatrix} A_{\alpha_1 \tau \alpha_3 \ldots \alpha_l} \cdots \right]$$

(30):

$$A_s^{\alpha_1 \ldots \alpha_l} = \frac{\partial A^{\alpha_1 \ldots \alpha_l}}{\partial x_s} - \sum_{\tau} \left[\begin{Bmatrix} s \, \tau \\ \alpha_1 \end{Bmatrix} A^{\tau\alpha_2 \ldots \alpha_l} + \begin{Bmatrix} s \, \tau \\ \alpha_2 \end{Bmatrix} A_{\alpha_1 \tau \alpha_3 \ldots \alpha_l} + \cdots \right]$$

(31):

$$A^{\alpha_1 \cdots \alpha_{-1}} = \sum_{\alpha_l s} A_s^{\alpha_1 \cdots \alpha_l} \delta_{\alpha_l}^s$$

(24):

$$\begin{bmatrix} \mu \, \nu \\ \sigma \end{bmatrix} = \frac{1}{2} \left(\frac{\partial g_{\mu\tau}}{\partial x_{\nu}} + \frac{\partial g_{\nu\sigma}}{\partial x_{\mu}} - \frac{\partial g_{\mu\nu}}{\partial x_{\sigma}} \right)$$

(24a):

$$\begin{Bmatrix} \mu\,\nu \\ \tau \end{Bmatrix} = \sum_{\sigma} g^{\sigma\tau} \begin{bmatrix} \mu\,\nu \\ \sigma \end{bmatrix}$$

(37):

$$\Phi = \frac{1}{\sqrt{g}} \sum_{\mu} \frac{\partial}{\partial x_\mu} \left(\sqrt{g} A^\mu\right)$$

(40):

$$A^\mu = \frac{1}{\sqrt{g}} \sum_{\nu} \frac{\partial \left(A^{\mu\nu}\sqrt{g}\right)}{\partial x_\nu}$$

(41):

$$A_\sigma = \frac{1}{\sqrt{g}} \sum_{\mu\nu} \left(\frac{\partial \left(g_{\mu\sigma} A^{\mu\nu} \sqrt{g}\right)}{\partial x_\nu} - \frac{1}{2} \frac{\partial g_{\mu\nu}}{\partial x_\sigma} A^{\mu\nu} \sqrt{g} \right)$$

(41a):

$$A_\sigma = \frac{1}{\sqrt{g}} \left(\sum_{\nu} \frac{\partial \left(A_\sigma^\nu \sqrt{g}\right)}{\partial x_\nu} - \frac{1}{2} \sum_{\mu\nu\tau} g^{\tau\mu} \frac{\partial g_{\mu\nu}}{\partial x_\sigma} A_\tau^\nu \sqrt{g} \right)$$

(41b):

$$\mathfrak{A}_\sigma = \sum_{\nu} \frac{\partial \mathfrak{A}_\sigma^\nu}{\partial x_\nu} - \frac{1}{2} \sum_{\mu\tau\nu} g^{\tau\mu} \frac{\partial g_{\mu\nu}}{\partial x_\sigma} \mathfrak{A}_\tau^\nu,$$

onde $\mathfrak{A}_\sigma = A_\sigma \sqrt{g}$ e $\mathfrak{A}_\sigma^\nu = A_\sigma^\nu \sqrt{g}$ são V-tensores.
(42a):

$$\sum_{\nu} \frac{\partial \mathfrak{T}_\sigma^\nu}{\partial x_\nu} = \frac{1}{2} \sum_{\mu\tau\nu} g^{\tau\mu} \frac{\partial g_{\mu\nu}}{\partial x_\sigma} \mathfrak{T}_\tau^\nu + \mathfrak{K}_\sigma,$$

onde $\mathfrak{T}_\sigma^\nu = T_\sigma^\nu \sqrt{g}$ e $\mathfrak{K}_\sigma = K_\sigma \sqrt{g}$ são V-tensores.
(23b):

$$\frac{d^2 x_\tau}{ds^2} + \sum_{\mu\nu} \begin{Bmatrix} \mu\,\nu \\ \tau \end{Bmatrix} \frac{dx_\mu}{ds} \frac{dx_\nu}{ds} = 0$$