Metrica de Rindler

Coordenadas: Cartesianas

Tensor métrico

$$g_{\mu\nu} = \begin{bmatrix} -x^2 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

Símbolos de Christoffel

$$\Gamma^0_{00} = 0$$
$$\Gamma^0_{01} = \frac{1}{x}$$
$$\Gamma^0_{02} = 0$$
$$\Gamma^0_{03} = 0$$
$$\Gamma^0_{10} = \frac{1}{x}$$
$$\Gamma^0_{11} = 0$$
$$\Gamma^0_{12} = 0$$
$$\Gamma^0_{13} = 0$$
$$\Gamma^0_{20} = 0$$
$$\Gamma^0_{21} = 0$$
$$\Gamma^0_{22} = 0$$
$$\Gamma^0_{23} = 0$$
$$\Gamma^0_{30} = 0$$
$$\Gamma^0_{31} = 0$$
$$\Gamma^0_{32} = 0$$
$$\Gamma^0_{33} = 0$$
$$\Gamma^1_{00} = x$$
$$\Gamma^1_{01} = 0$$
$$\Gamma^1_{02} = 0$$
$$\Gamma^1_{03} = 0$$
$$\Gamma^1_{10} = 0$$

$$\Gamma^{1}_{11} = 0$$
$$\Gamma^{1}_{12} = 0$$
$$\Gamma^{1}_{13} = 0$$
$$\Gamma^{1}_{20} = 0$$
$$\Gamma^{1}_{21} = 0$$
$$\Gamma^{1}_{22} = 0$$
$$\Gamma^{1}_{23} = 0$$
$$\Gamma^{1}_{30} = 0$$
$$\Gamma^{1}_{31} = 0$$
$$\Gamma^{1}_{32} = 0$$
$$\Gamma^{1}_{33} = 0$$
$$\Gamma^{2}_{00} = 0$$
$$\Gamma^{2}_{01} = 0$$
$$\Gamma^{2}_{02} = 0$$
$$\Gamma^{2}_{03} = 0$$
$$\Gamma^{2}_{10} = 0$$
$$\Gamma^{2}_{11} = 0$$
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$$\Gamma^{2}_{30} = 0$$
$$\Gamma^{2}_{31} = 0$$
$$\Gamma^{2}_{32} = 0$$
$$\Gamma^{2}_{33} = 0$$
$$\Gamma^{3}_{00} = 0$$
$$\Gamma^{3}_{01} = 0$$
$$\Gamma^{3}_{02} = 0$$
$$\Gamma^{3}_{03} = 0$$
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$$\Gamma^3_{23} = 0$$
$$\Gamma^3_{30} = 0$$
$$\Gamma^3_{31} = 0$$
$$\Gamma^3_{32} = 0$$
$$\Gamma^3_{33} = 0$$

Componentes del tensor de Ricci

$$R_{00} = 0$$
$$R_{01} = 0$$
$$R_{02} = 0$$
$$R_{03} = 0$$
$$R_{10} = 0$$
$$R_{11} = 0$$
$$R_{12} = 0$$
$$R_{13} = 0$$
$$R_{20} = 0$$
$$R_{21} = 0$$
$$R_{22} = 0$$
$$R_{23} = 0$$
$$R_{30} = 0$$
$$R_{31} = 0$$
$$R_{32} = 0$$
$$R_{33} = 0$$

Componentes del tensor de Einstein

$$G_{00} = 0$$

$$G_{01} = 0$$
$$G_{02} = 0$$
$$G_{03} = 0$$
$$G_{10} = 0$$
$$G_{11} = 0$$
$$G_{12} = 0$$
$$G_{13} = 0$$
$$G_{20} = 0$$
$$G_{21} = 0$$
$$G_{22} = 0$$
$$G_{23} = 0$$
$$G_{30} = 0$$
$$G_{31} = 0$$
$$G_{32} = 0$$
$$G_{33} = 0$$

Tensor de Estres-Energía

$$T_{\mu\nu} = \begin{bmatrix} x^4\left(\rho(t) + p(t)\right) - x^2 p(t) & 0 & 0 & 0 \\ 0 & p(t) & 0 & 0 \\ 0 & 0 & p(t) & 0 \\ 0 & 0 & 0 & p(t) \end{bmatrix}$$

Ecuaciones de campo de Einstein

$$0 = 8\pi G\left(x^4\left(\rho(t) + p(t)\right) - x^2 p(t)\right) \tag{1}$$

$$0 = 8\pi G\left(p(t)\right) \tag{2}$$

$$0 = 8\pi G\left(p(t)\right) \tag{3}$$

$$0 = 8\pi G\left(p(t)\right) \tag{4}$$

Determinante del tensor métrico

$$g = -x^2 \tag{5}$$

Curvatura Gaussiana

$$\begin{aligned}\kappa &= \frac{R_{1212}}{g} \\ &= \frac{0}{-x^2} \\ &= 0\end{aligned} \tag{6}$$

donde $R_{\alpha\beta\gamma\delta}$ es el tensor de Riemann.

Ecuaciones de la Geodésica

$$0 = \frac{d^2}{d\tau^2}t(\tau) + \frac{2\frac{d}{d\tau}t(\tau)\frac{d}{d\tau}x(\tau)}{x(\tau)} \tag{7}$$

$$0 = x(\tau)\left(\frac{d}{d\tau}t(\tau)\right)^2 + \frac{d^2}{d\tau^2}x(\tau) \tag{8}$$

$$0 = \frac{d^2}{d\tau^2}y(\tau) \tag{9}$$

$$0 = \frac{d^2}{d\tau^2}z(\tau) \tag{10}$$

Lagrangiano

$$\mathcal{L} = \left[-x^2(\tau)\left(\frac{d}{d\tau}t(\tau)\right)^2 + \left(\frac{d}{d\tau}x(\tau)\right)^2 + \left(\frac{d}{d\tau}y(\tau)\right)^2 + \left(\frac{d}{d\tau}z(\tau)\right)^2\right]^{1/2} \tag{11}$$