

The script “static-spherical-metric.txt” computes the Einstein tensor $G_{\mu\nu}$ for the metric

$$g_{\mu\nu} = \begin{pmatrix} -e^{2\Phi} & 0 & 0 & 0 \\ 0 & e^{2\Lambda} & 0 & 0 \\ 0 & 0 & r^2 & 0 \\ 0 & 0 & 0 & r^2 \sin^2 \theta \end{pmatrix}$$

and verifies that

$$G_{\mu\nu} = \begin{pmatrix} G_{tt} & 0 & 0 & 0 \\ 0 & G_{rr} & 0 & 0 \\ 0 & 0 & G_{\theta\theta} & 0 \\ 0 & 0 & 0 & G_{\phi\phi} \end{pmatrix}$$

where

$$G_{tt} = \frac{1}{r^2} e^{2\Phi} \frac{d}{dr} [r(1 - e^{-2\Lambda})]$$

$$G_{rr} = -\frac{1}{r^2} e^{2\Lambda} (1 - e^{-2\Lambda}) + \frac{2}{r} \Phi'$$

$$G_{\theta\theta} = r^2 e^{-2\Lambda} [\Phi'' + (\Phi')^2 + \Phi'/r - \Phi'\Lambda' - \Lambda'/r]$$

$$G_{\phi\phi} = G_{\theta\theta} \sin^2 \theta$$

The Φ and Λ are unspecified functions of radius r . See “A First Course in General Relativity” p. 255.