Coordinate System

$$(t,\, r,\, \theta,\, \phi)$$

Metric Tensor

$$g = \begin{pmatrix} c^2 \left(\frac{2GM}{c^2 r} - 1\right) & 0 & 0 & 0 \\ 0 & \frac{1}{-\frac{2GM}{c^2 r} + 1} & 0 & 0 \\ 0 & 0 & r^2 & 0 \\ 0 & 0 & 0 & r^2 \sin^2(\theta) \end{pmatrix}$$

Geodesic Equations

$$\ddot{t} + \frac{2GM}{r\left(-2GM + c^2 r\right)} \dot{t}\dot{r} = 0$$

$$\ddot{r} + \frac{GM\left(-2GM + c^2 r\right)}{c^2 r^3} \dot{t}^2 + \frac{GM}{r\left(2GM - c^2 r\right)} \dot{r}^2 + \left(\frac{2GM}{c^2} - r\right) \dot{\theta}^2 + \frac{\left(2GM - c^2 r\right) \sin^2(\theta)}{c^2} \dot{\phi}^2 = 0$$

$$\ddot{\theta} + \frac{2}{r} \dot{r}\dot{\theta} - \frac{\sin(2\theta)}{2} \dot{\phi}^2 = 0$$

$$\ddot{\phi} + \frac{2}{r} \dot{r}\dot{\phi} + \frac{2}{\tan(\theta)} \dot{\theta}\dot{\phi} = 0$$

Christoffel Symbols (non-zero)

$$\Gamma^{t}_{tr} = \frac{GM}{r\left(-2GM + c^{2} r\right)}$$

$$\Gamma^{t}_{rt} = \frac{GM}{r\left(-2GM + c^{2} r\right)}$$

$$\Gamma^{r}_{tt} = \frac{GM\left(-2GM + c^{2} r\right)}{c^{2} r^{3}}$$

$$\Gamma^{r}_{rr} = \frac{GM}{r\left(2GM - c^{2} r\right)}$$

$$\Gamma^{r}_{\theta\theta} = \frac{2GM}{c^{2}} - r$$

$$\Gamma^{r}_{\phi\phi} = \frac{\left(2GM - c^{2} r\right)\sin^{2}\left(\theta\right)}{c^{2}}$$

$$\Gamma^{\theta}_{r\theta} = \frac{1}{r}$$

$$\Gamma^{\theta}_{\theta r} = \frac{1}{r}$$

$$\Gamma^{\theta}_{\phi\phi} = -\frac{\sin\left(2\theta\right)}{2}$$

$$\Gamma^{\phi}_{r\phi} = \frac{1}{r}$$

$$\Gamma^{\phi}_{\theta\phi} = \frac{1}{\tan\left(\theta\right)}$$

$$\Gamma^{\phi}_{\phi r} = \frac{1}{r}$$

$$\Gamma^{\phi}_{\phi\theta} = \frac{1}{\tan\left(\theta\right)}$$

Riemann Curvature Tensor (non-zero components)

$$R^{t}_{rtr} = \frac{2GM}{r^{2}\left(-2GM + c^{2}r\right)}$$
$$R^{t}_{rrt} = \frac{2GM}{r^{2}\left(2GM - c^{2}r\right)}$$
$$R^{t}_{\theta t\theta} = -\frac{GM}{c^{2}r}$$
$$R^{t}_{\theta\theta t} = \frac{GM}{c^{2}r}$$
$$R^{t}_{\phi t\phi} = -\frac{GM\sin^{2}\left(\theta\right)}{c^{2}r}$$
$$R^{t}_{\phi\phi t} = \frac{GM\sin^{2}\left(\theta\right)}{c^{2}r}$$
$$R^{r}_{ttr} = \frac{2GM\left(-2GM + c^{2}r\right)}{c^{2}r^{4}}$$
$$R^{r}_{trt} = \frac{2GM\left(2GM - c^{2}r\right)}{c^{2}r^{4}}$$
$$R^{r}_{\theta r\theta} = -\frac{GM}{c^{2}r}$$
$$R^{r}_{\theta\theta r} = \frac{GM}{c^{2}r}$$
$$R^{r}_{\phi r\phi} = -\frac{GM\sin^{2}\left(\theta\right)}{c^{2}r}$$
$$R^{r}_{\phi\phi r} = \frac{GM\sin^{2}\left(\theta\right)}{c^{2}r}$$
$$R^{\theta}_{tt\theta} = \frac{GM\left(2GM - c^{2}r\right)}{c^{2}r^{4}}$$
$$R^{\theta}_{t\theta t} = \frac{GM\left(-2GM + c^{2}r\right)}{c^{2}r^{4}}$$
$$R^{\theta}_{rr\theta} = \frac{GM}{r^{2}\left(-2GM + c^{2}r\right)}$$
$$R^{\theta}_{r\theta r} = \frac{GM}{r^{2}\left(2GM - c^{2}r\right)}$$
$$R^{\theta}_{\phi\theta\phi} = \frac{2GM\sin^{2}\left(\theta\right)}{c^{2}r}$$
$$R^{\theta}_{\phi\phi\theta} = -\frac{2GM\sin^{2}\left(\theta\right)}{c^{2}r}$$
$$R^{\phi}_{tt\phi} = \frac{GM\left(2GM - c^{2}r\right)}{c^{2}r^{4}}$$
$$R^{\phi}_{t\phi t} = \frac{GM\left(-2GM + c^{2}r\right)}{c^{2}r^{4}}$$
$$R^{\phi}_{rr\phi} = \frac{GM}{r^{2}\left(-2GM + c^{2}r\right)}$$
$$R^{\phi}_{r\phi r} = \frac{GM}{r^{2}\left(2GM - c^{2}r\right)}$$
$$R^{\phi}_{\theta\theta\phi} = -\frac{2GM}{c^{2}r}$$
$$R^{\phi}_{\theta\phi\theta} = \frac{2GM}{c^{2}r}$$

Ricci Tensor (non-zero components)

none

Ricci Scalar

$$R = 0$$

Einstein Tensor (non-zero components)

none