

Coordinate System

$$(\theta, \phi)$$

Metric Tensor

$$g = \begin{pmatrix} 1 & 0 \\ 0 & \sin^2(\theta) \end{pmatrix}$$

Geodesic Equations

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

Christoffel Symbols (non-zero)

$$\Gamma_{\phi\phi}^{\theta} = -\frac{\sin(2\theta)}{2}$$
$$\Gamma_{\theta\phi}^{\phi} = \frac{1}{\tan(\theta)}$$
$$\Gamma_{\phi\theta}^{\phi} = \frac{1}{\tan(\theta)}$$

Riemann Curvature Tensor (non-zero components)

$$R_{\phi\theta\phi}^{\theta} = \sin^2(\theta)$$
$$R_{\phi\phi\theta}^{\theta} = -\sin^2(\theta)$$
$$R_{\theta\theta\phi}^{\phi} = -1$$
$$R_{\theta\phi\theta}^{\phi} = 1$$

Ricci Tensor (non-zero components)

$$R_{\theta\theta} = 1$$
$$R_{\phi\phi} = \sin^2(\theta)$$

Ricci Scalar

$$R = 2$$

Einstein Tensor (non-zero components)

none