Next, Eq 6 and Eq 7 will be put into the standard form for a system of first order differential equations. In Eq 9, y and f are arrays as shown in the next set of equations.

Eq 9: $$\frac{dy}{dS} = f(y,S).$$

For the Riemannian 3-space this becomes

Eq 10: $$\frac{dy_0}{dS} = \frac{dx^0}{dS} = \lambda^0 = y_3 = f_0(y_0,\dots,y_5,S)$$

Eq 11: $$\frac{dy_1}{dS} = \frac{dx^1}{dS} = \lambda^1 = y_4 = f_1(y_0,\dots,y_5,S)$$

Eq 12: $$\frac{dy_2}{dS} = \frac{dx^2}{dS} = \lambda^2 = y_5 = f_2(y_0,\dots,y_5,S)$$

Eq 13: $$\frac{dy_3}{dS} = \frac{d\lambda^0}{dS} = -\begin{Bmatrix} 0 \\ \alpha\beta \end{Bmatrix}\lambda^\alpha\lambda^\beta - \begin{Bmatrix} 0 \\ \alpha\beta \end{Bmatrix} y_{3+\alpha}y_{3+\beta} = f_3(y_0,\dots,y_5,S)$$

Eq 14: $$\frac{dy_4}{dS} = \frac{d\lambda^1}{dS} = -\begin{Bmatrix} 1 \\ \alpha\beta \end{Bmatrix}\lambda^\alpha\lambda^\beta - \begin{Bmatrix} 1 \\ \alpha\beta \end{Bmatrix} y_{3+\alpha}y_{3+\beta} = f_4(y_0,\dots,y_5,S)$$

Eq 15: $$\frac{dy_5}{dS} = \frac{d\lambda^2}{dS} = -\begin{Bmatrix} 2 \\ \alpha\beta \end{Bmatrix}\lambda^\alpha\lambda^\beta - \begin{Bmatrix} 2 \\ \alpha\beta \end{Bmatrix} y_{3+\alpha}y_{3+\beta} = f_5(y_0,\dots,y_5,S)$$

There are six unknown functions of S: $y_0, y_1, y_2, y_3, y_4, y_5$. The first three of these are the coordinate variables $x^i \leftrightarrow r\theta\varphi$ for $i = 0, 1,$ and 2. The last three are the first derivatives of the x^i with respect to S. Thus, the first three functions, f_i, are the last three unknowns, and the last three functions, f_{3+i}, will be obtained from the last part of Eq 8. First, however, the Christoffel symbols must be defined.