The Y-parameters of the transmission line are

$$\begin{bmatrix} I_S \\ -I_R \end{bmatrix} = \begin{bmatrix} Y_{11} & Y_{12} \\ Y_{21} & Y_{22} \end{bmatrix} \begin{bmatrix} V_S \\ V_R \end{bmatrix}$$

Suppose that these are determined from experiment.

Approximate each with a rational function

$$Y_{ij} = \frac{a_{nij}s^{n-1}+..+a_{0ij}}{s^n+..b_{0ij}}$$

Consider the open-circuit case

$$I_R = 0$$

$$\frac{V_R}{V_S} = -\frac{Y_{21}}{Y_{22}} = f\left(\frac{a_{n21}s^{n-1}+..a_{021}}{s^n+..b_{021}}, \frac{a_{n22}s^{n-1}+..a_{022}}{s^n+..b_{022}}\right) = -\frac{\frac{a_{n21}s^{n-1}+..a_{021}}{s^n+..b_{021}}}{\frac{a_{n22}s^{n-1}+..a_{022}}{s^n+..b_{022}}}$$

$$= \frac{f_{n-1}s^{n-1}+..f_0}{s^n + g_{n-1}s^{n-1}+..+g_0}$$

Convert this function to a state space.

This is done as described in systems notes.

Proceed to with AWE to get time domain model.