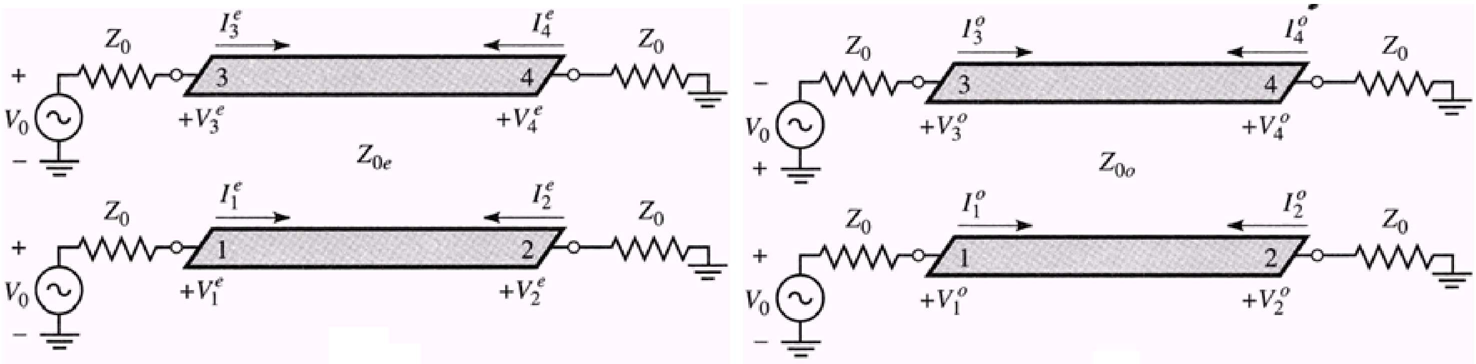

$$V_1^e = V_0 \frac{Z_{in}^e}{Z_{in}^e + Z_0}, \qquad V_1^o = V_0 \frac{Z_{in}^o}{Z_{in}^o + Z_0}$$

$$Z_{in}^e = Z_{0e} \frac{\sqrt{Z_{0o}} + j\sqrt{Z_{0e}} \tan\theta}{\sqrt{Z_{0e}} + j\sqrt{Z_{0o}} \tan\theta}, \qquad Z_{in}^o = Z_{0o} \frac{\sqrt{Z_{0e}} + j\sqrt{Z_{0o}} \tan\theta}{\sqrt{Z_{0o}} + j\sqrt{Z_{0e}} \tan\theta}$$

$$\frac{Z_{in}^e}{Z_{in}^e + Z_0} = \frac{Z_{0e}\left(\sqrt{Z_{0o}} + j\sqrt{Z_{0e}} \tan\theta\right)}{Z_{0e}\left(\sqrt{Z_{0o}} + j\sqrt{Z_{0e}} \tan\theta\right) + \sqrt{Z_{0e}Z_{0o}}\left(\sqrt{Z_{0e}} + j\sqrt{Z_{0o}} \tan\theta\right)} = \frac{Z_{0e}\left(\sqrt{Z_{0o}} + j\sqrt{Z_{0e}} \tan\theta\right)}{2Z_{0e}\sqrt{Z_{0o}} + j\sqrt{Z_{0e}}\left(Z_{0e} + Z_{0o}\right)\tan\theta}$$

$$\frac{Z_{in}^e}{Z_{in}^e + Z_0} = \frac{Z_0 + jZ_{0e}\tan\theta}{2Z_0 + j\left(Z_{0e} + Z_{0o}\right)\tan\theta}$$

$$\frac{Z_{in}^o}{Z_{in}^o + Z_0} = \frac{Z_0 + jZ_{0o}\tan\theta}{2Z_0 + j\left(Z_{0e} + Z_{0o}\right)\tan\theta}$$

$$V_3 = V_3^e + V_3^o = V_1^e - V_1^o = V_0 \frac{j\left(Z_{0e} - Z_{0o}\right)\tan\theta}{2Z_0 + j\left(Z_{0e} + Z_{0o}\right)\tan\theta}$$

Defining

$$C = \frac{Z_{0e} - Z_{0o}}{Z_{0e} + Z_{0o}}, \qquad \sqrt{1 - C^2} = \frac{2Z_0}{Z_{0e} + Z_{0o}}$$

$$\boxed{V_3 = V_0 \frac{jC\tan\theta}{\sqrt{1 - C^2} + j\tan\theta}}$$

V_2 and V_4

$A = \cos\beta l$ $\qquad$ $B = jZ_0 \sin\beta l$

$C = jY_0 \sin\beta l$ $\qquad$ $D = \cos\beta l$

$$\begin{bmatrix} V_1^{eo} \\ I_1^{eo} \end{bmatrix} = \begin{bmatrix} \cos\theta & jZ_{0eo}\sin\theta \\ jY_{0eo}\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} V_2^{eo} \\ -I_2^{eo} \end{bmatrix} \Longrightarrow \begin{bmatrix} V_2^{eo} \\ -I_2^{eo} \end{bmatrix} = \begin{bmatrix} \cos\theta & -jZ_{0eo}\sin\theta \\ -jY_{0eo}\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} V_1^{eo} \\ I_1^{eo} \end{bmatrix}$$

$$V_2^e = V_1^e \cos\theta - jZ_{0eo} I_1^{eo} \sin\theta$$

$$V_1^e = V_0 \frac{Z_{in}^e}{Z_{in}^e + Z_0} = V_0 \frac{Z_0 + jZ_{0e}\tan\theta}{2Z_0 + j\left(Z_{0e} + Z_{0o}\right)\tan\theta}$$

$$I_1^e = \frac{V_0}{Z_{in}^e + Z_0} = \frac{V_0\left(\sqrt{Z_{0e}} + j\sqrt{Z_{0o}}\tan\theta\right)}{2Z_{0e}\sqrt{Z_{0o}} + j\sqrt{Z_{0e}}\left(Z_{0e} + Z_{0o}\right)\tan\theta} = \frac{V_0\left(Z_0 + jZ_{0o}\tan\theta\right)}{2Z_0^2 + jZ_0\left(Z_{0e} + Z_{0o}\right)\tan\theta}$$

$$V_2^e = V_0\frac{\left(Z_0 + jZ_{0e}\tan\theta\right)\cos\theta - jZ_{0e}\left(1 + jZ_{0o}\tan\theta/Z_0\right)\sin\theta}{2Z_0 + j\left(Z_{0e} + Z_{0o}\right)\tan\theta} = V_0\frac{Z_0}{2Z_0\cos\theta + j\left(Z_{0e} + Z_{0o}\right)\sin\theta}$$

$$V_2^o = V_0\frac{Z_0}{2Z_0\cos\theta + j\left(Z_{0e} + Z_{0o}\right)\sin\theta}$$

$$\boxed{V_2 = V_2^e + V_2^o = V_0\frac{2Z_0}{2Z_0\cos\theta + j\left(Z_{0e} + Z_{0o}\right)\sin\theta} = V_0\frac{\sqrt{1 - C^2}}{\sqrt{1 - C^2}\cos\theta + j\sin\theta}}$$

$$\boxed{V_3 = V_2^e - V_2^o = 0}$$

$$a_1 = \frac{V_1 + I_1 Z_0}{2\sqrt{Z_0}} = \frac{V_0}{\sqrt{Z_0}}, \qquad b_1 = 0$$

$$b_2 = \frac{V_2 - I_2 Z_0}{2\sqrt{Z_0}} = \frac{V_2}{\sqrt{Z_0}} = \frac{V_0}{\sqrt{Z_0}}\frac{\sqrt{1 - C^2}}{\sqrt{1 - C^2}\cos\theta + j\sin\theta}$$

$$b_3 = \frac{V_3}{\sqrt{Z_0}} = \frac{V_0}{\sqrt{Z_0}}\frac{jC\tan\theta}{\sqrt{1 - C^2} + j\tan\theta}$$

$$b_4 = 0$$