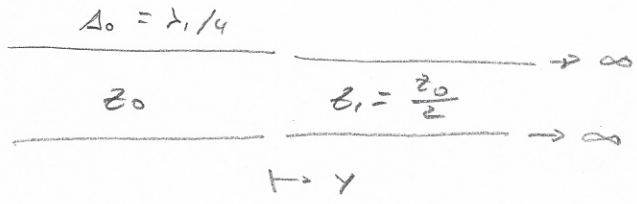
HW 10 Jesus Gil Gil

10.2 Impedance Transformation II



10.2.1 Hand Calculation

$$z_{in}(y) = z_0 \frac{1+\tilde{\rho}_0(y)}{1-\tilde{\rho}_0(y)} \Rightarrow \tilde{\rho}_1(y) = 0 \Rightarrow \infty$$

$$z_0 \frac{1+\tilde{\rho}_0(0)}{1-\tilde{\rho}_0(0)} = z_1 \frac{1+\tilde{\rho}_1(0)}{1-\tilde{\rho}_1(0)} \quad (\tilde{\rho}_1(0) = 0) \Rightarrow \text{solve for } \tilde{\rho}_0(0)$$

$$\tilde{\rho}_0(0) = \frac{z_1 - z_0}{z_1 + z_0} = \frac{z_1/z_0 - 1}{z_1/z_0 + 1} = \frac{1/2 - 1}{1/2 + 1} = -\frac{1}{3} \text{ or } \frac{1}{3} \angle 180^\circ$$

$$z_0(-1/4) = z_0 \frac{1+\tilde{\rho}_0(-1/4)}{1-\tilde{\rho}_0(-1/4)}; \quad \tilde{\rho}_0(-1/4) = -\frac{1}{3} e^{-2j\frac{2\pi}{\lambda_1}\frac{\lambda}{4}} = \frac{1}{3}$$

$$z_1(-1/4) = z_0 \frac{1+1/3}{1-1/3} = 2z_0$$

10.2.2. Smith Chart

$$\frac{z_1}{z_0} = r + jx; \quad \frac{z_1}{z_0} = \frac{z_0/2}{z_0} = \frac{1}{2} \Rightarrow r = \frac{1}{2}, \; x = 0, \; \angle 180^\circ$$

at $\tilde{\rho}_0(-1/4) \Rightarrow r = 2, \; x = 0$

$$z(-1/4) = z_0(r + jx) = 2z_0$$

The Complete Smith Chart

Black Magic Design