

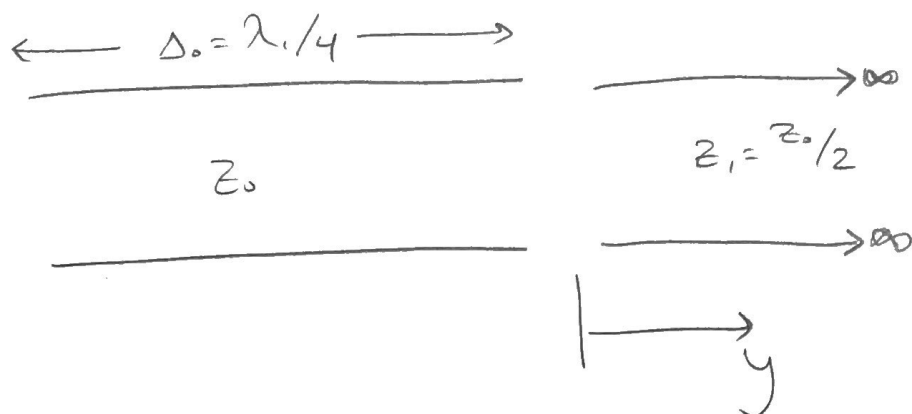
10.2)

Matthew Jackson

PHYS 513

HW #10

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10.2.1.1) What is $\tilde{\rho}_0(0)$?

$$Z_n(0) = \frac{\tilde{Z}_0(1 + \tilde{\rho}_0(0))}{(1 - \tilde{\rho}_0(0))} = \frac{\tilde{Z}_1(1 + \tilde{\rho}_1(0))}{(1 - \tilde{\rho}_1(0))}$$

$\tilde{\rho}_1 = 0$ because no reflected wave

$$\tilde{\rho}_0(0) = \frac{\frac{Z_1}{Z_0} - 1}{\frac{Z_1}{Z_0} + 1}$$

$$Z_1 = \frac{Z_0}{2}$$

$$\tilde{\rho}_0(0) = \frac{\frac{1}{2} - 1}{\frac{1}{2} + 1} \rightarrow \frac{-\frac{1}{2}}{\frac{3}{2}}$$

$$\boxed{\tilde{\rho}_0(0) = -\frac{1}{3}}$$

10.2.1.2) What is $z_0(-\lambda/4)$

$$\tilde{p}_0(y) = \tilde{p}_0(0) e^{2j\beta y} \quad \beta = 2\pi/\lambda$$

$$\tilde{p}_0(-\lambda/4) = -\frac{1}{3} e^{2j(2\pi/\lambda)(-\lambda/4)}$$

$$\tilde{p}_0(-\lambda/4) = -\frac{1}{3} e^{-j\pi} \quad e^{-j\pi} = -1$$

$$\tilde{p}_0(-\lambda/4) = \frac{1}{3}$$

$$z_n(y) = z_0 \left[\frac{1 + \tilde{p}_n(y)}{1 - \tilde{p}_n(y)} \right]$$

$$\begin{aligned} z_0(-\lambda/4) &= z_0 \left[\frac{1 + \tilde{p}_0(-\lambda/4)}{1 - \tilde{p}_0(-\lambda/4)} \right] \\ &= z_0 \left[\frac{1 + 1/3}{1 - 1/3} \right] \rightarrow \frac{4/3}{2/3} \end{aligned}$$

$$z_0(-\lambda/4) = 2z_0$$

10.2.2.1) Compute $z_1(0)/z_0(0)$ and $r \neq x$

$$\frac{z_1(0)}{z_0(0)} = \frac{1}{2}$$

$$r = 1/2 \quad x = 0$$

10.2.2.2) Reference slide 5 From
HW10 - Smith Charts. pptx

$$p_0(0) = 0.5$$

10.2.2.3) Reference slide 6 From
HW10 - Smith Charts. pptx

$$\frac{z_*}{z_0} = 2$$

10.2.2.4)

$$r = 2 \quad x = 0$$

10.2.2.5)

$$z_0(-\lambda/4) = 2 z_0$$