11.30 Find the input impedance of a short-circuited coaxial transmission line of Figure 11.48 if $Z_o = 65 + j38\ \Omega$, $\gamma = 0.7 + j2.5/\text{m}$, $\ell = 0.8$ m.

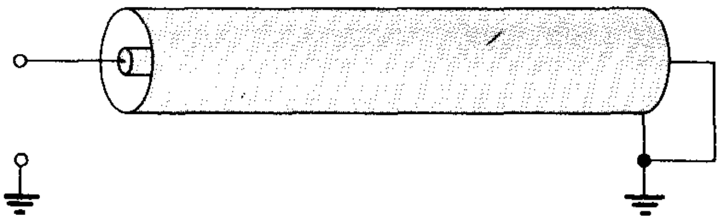
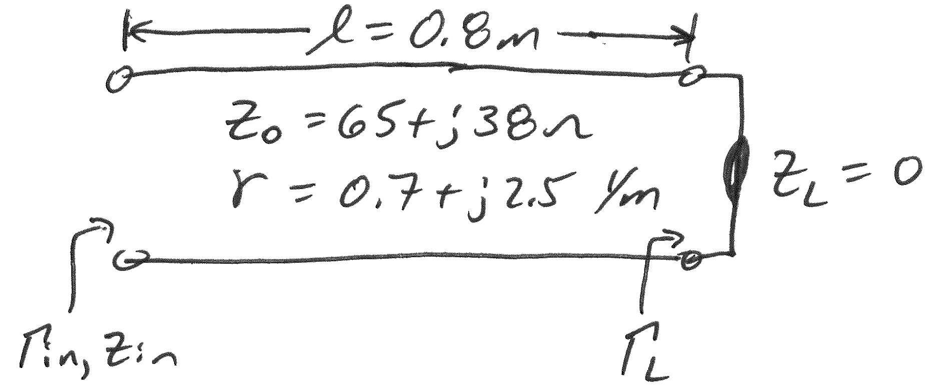


FIGURE 11.48
For Problem 11.30

- Also, calculate the load Γ_L & input Γ_{in} reflection coefficients.



$$(11.36)\quad \Gamma_L = \frac{Z_L - Z_o}{Z_L + Z_o} = \frac{0 - Z_o}{0 + Z_o} \Rightarrow \underline{\underline{\Gamma_L = -1}}$$

$$(11.37)\quad \Gamma(z) = \Gamma_L e^{-2\gamma \ell'} \qquad \ell' = \ell - z$$

$$\hookrightarrow \Gamma_{in} = \Gamma(0) = \Gamma_L e^{-2\gamma\ell}$$

$$= -1\, e^{-2(0.7+j2.5)0.8}$$

$$\underline{\underline{\Gamma_{in} = 0.32628 \angle -49.183^\circ}}$$

$$(11.33)\quad Z_{in} = Z_o\left[\frac{Z_L + Z_o \tanh(\gamma\ell)}{Z_o + Z_L \tanh(\gamma\ell)}\right] \text{ or } = Z_o \frac{1+\Gamma_{in}}{1-\Gamma_{in}}$$

$$= (65+j38)\frac{1+0.3263\angle -49.18^\circ}{1-0.3263\angle -49.18^\circ}$$

$$\underline{\underline{Z_{in} = 113.024 + j2.726\ \Omega}}$$