

2.39 A $75\ \Omega$ resistive load is preceded by a $\lambda/4$ section of a $50\ \Omega$ lossless line, which itself is preceded by another $\lambda/4$ section of a $100\ \Omega$ line. What is the input impedance? Compare your result with that obtained through two successive applications of Module 2.5.

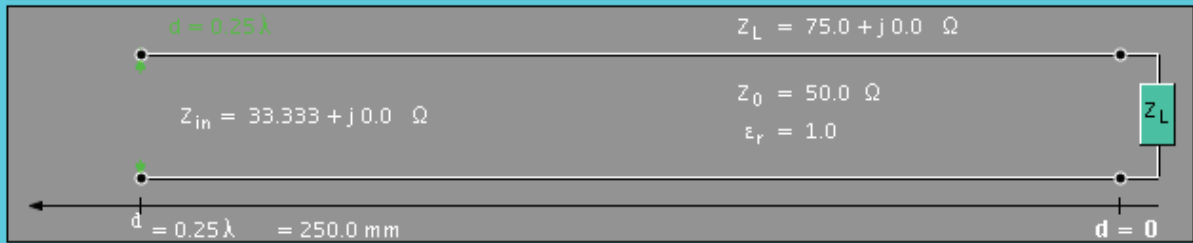
Solution: The input impedance of the $\lambda/4$ section of line closest to the load is found from Eq. (2.97):

$$Z_{\text{in}} = \frac{Z_0^2}{Z_L} = \frac{50^2}{75} = 33.33\ \Omega.$$

The input impedance of the line section closest to the load can be considered as the load impedance of the next section of the line. By reapplying Eq. (2.97), the next section of $\lambda/4$ line is taken into account:

$$Z_{\text{in}} = \frac{Z_0^2}{Z_L} = \frac{100^2}{33.33} = 300\ \Omega.$$

Options: Set Line and Load

$$Z = \frac{\lambda}{\lambda}$$


300.0 MHz

frequency

Choose length units: ☒ [λ] ☐ [m]

(press Update to activate choice)

Set Load

Characteristic Impedance $Z_0 = 50 \text{ } [\Omega]$

Relative Permittivity $\epsilon_r = 1$

Line Length $l = 0.25 \text{ } [\lambda]$

Update

$$Z_L = 75 + 0 \text{ } [\Omega]$$

☒ Impedance ☐ Admittance

Update