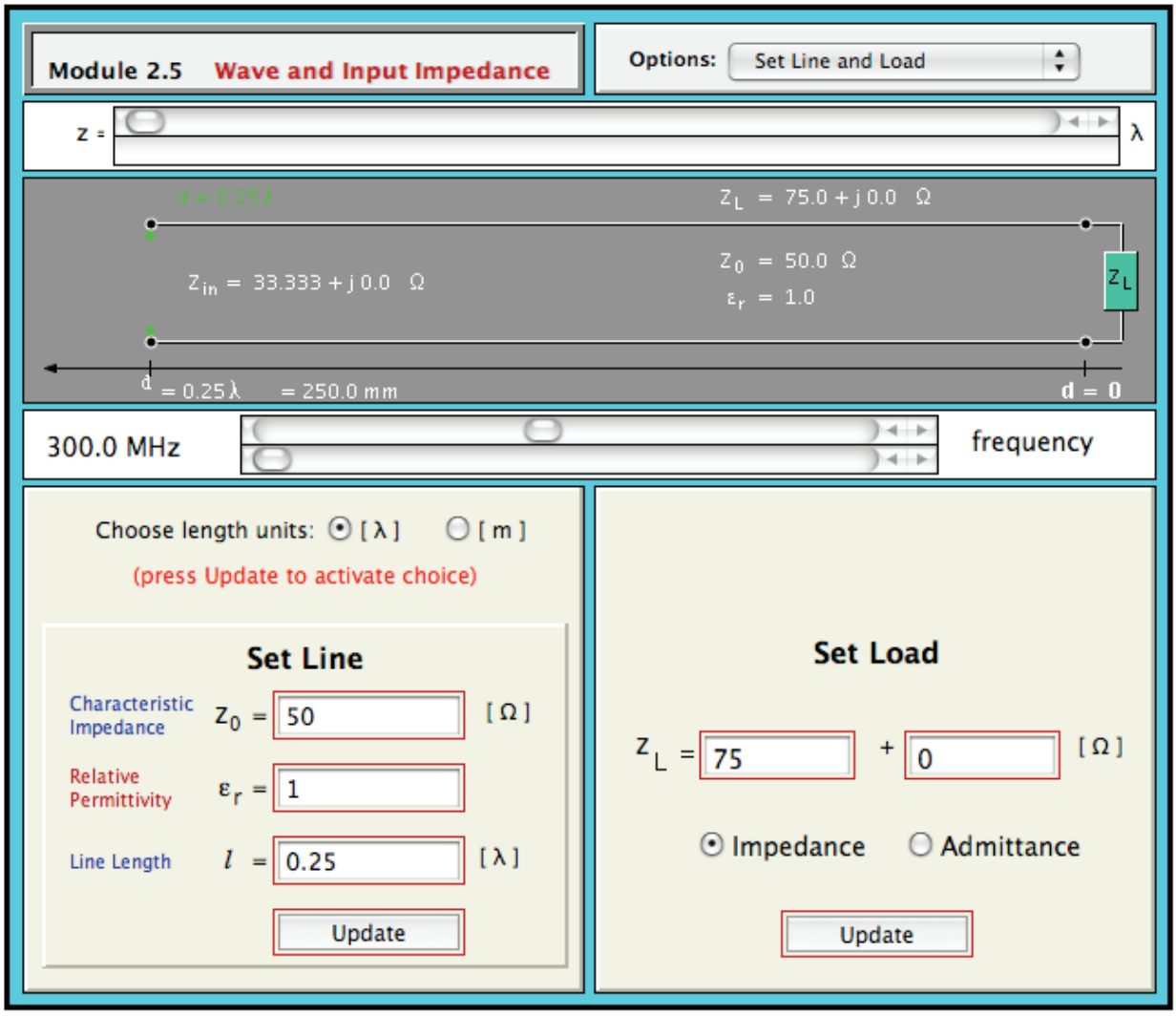
**2.39** A 75 Ω resistive load is preceded by a $\lambda/4$ section of a 50 Ω lossless line, which itself is preceded by another $\lambda/4$ section of a 100-Ω line. What is the input impedance? Compare your result with that obtained through two successive applications of CD Module 2.5.

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

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

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:

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


Module 2.5 Wave and Input Impedance
Options: Set Line and Load
z =
λ
d = 0.25 λ
$Z_L$ = 75.0 + j 0.0 Ω
$Z_{in}$ = 33.333 + j 0.0 Ω
$Z_0$ = 50.0 Ω
$\varepsilon_r$ = 1.0
$Z_L$
d = 0.25 λ = 250.0 mm
d = 0
300.0 MHz
frequency
Choose length units: [ λ ] [ m ]
(press Update to activate choice)
Set Line
Characteristic Impedance $Z_0$ = 50 [ Ω ]
Relative Permittivity $\varepsilon_r$ = 1
Line Length $l$ = 0.25 [ λ ]
Update
Set Load
$Z_L$ = 75 + 0 [ Ω ]
Impedance Admittance
Update