

2.25 Apply Module 2.4 to generate plots of the voltage standing-wave pattern for a $50\ \Omega$ line terminated in a load impedance $Z_L = (100 - j50)\ \Omega$. Set $V_g = 1\ \text{V}$, $Z_g = 50\ \Omega$, $\epsilon_r = 2.25$, $l = 40\ \text{cm}$, and $f = 1\ \text{GHz}$. Also determine S , d_{\max} , and d_{\min} .

Solution:

Module 2.4
Transmission Line Simulator
Options: Set Input / Output

d =

$d = 0.0\ \lambda = 0.0\ \text{m}$
 $Z_L = 100.0 - j\ 50.0\ \Omega$

$Z_g = 50.0 + j\ 0.0\ \Omega$
 $V_g = 1.0 + j\ 0.0\ \text{V}$
 $Z_0 = 50.0 + j\ 0.0\ \Omega$
 $\epsilon_r = 2.25$
 $f = 1.0\ \text{GHz}$
 $\lambda = 200.0\ \text{mm}$

$d = 2.0\ \lambda = 400.0\ \text{mm}$
 $d = 0$

Set Line
Length units: ☐ [λ] ☒ [m]

Low Loss Approximation
Characteristic Impedance $Z_0 = 50\ \Omega$
Frequency $f = 1\text{E}9\ \text{Hz}$
Relative Permittivity $\epsilon_r = 2.25$
Line Length $l = 0.4\ \text{[m]}$
Update

$Z_L = 100 + j\ -50\ \Omega$
☒ Impedance ☐ Admittance
Update

Set Generator
 $V_g = 1 + j\ 0\ \text{V}$
 $Z_g = 50 + j\ 0.0\ \Omega$
Update

Output
Transmission Line Data 2

SWR = 2.618 (load)

Amplitude of Incident Voltage Wave [V]
 $V_0^+ = 0.5 + j\ 0.0$
 $= 0.5\ \angle\ 0.0\ \text{rad}$

Location of First Voltage Maximum & Minimum
 $d\ (\text{max}) = 0.4631\ \lambda = 92.6208\ \text{mm}$
 $d\ (\text{min}) = 0.2131\ \lambda = 42.6208\ \text{mm}$

TIME-AVERAGE POWER
 $P(\text{abs}) = 2.0\ \text{[mW]}$
 $P(Z_g) = 1000.0\ \text{[}\mu\text{W]}$

Absorbed by load
Absorbed by Z_g

