

2.25 Apply CD 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 =

Z_g
 V_g
 $Z_g = 50.0 + j\,0.0\ \Omega$
 $V_g = 1.0 + j\,0.0\text{ V}$

$Z_0 = 50.0 + j\,0.0\ \Omega$
 $\epsilon_r = 2.25$

$f = 1.0\text{ GHz}$
 $\lambda = 200.0\text{ mm}$

$d = 0.0\lambda = 0.0\text{ m}$
 $Z_L = 100.0 - j\,50.0\ \Omega$
 $d = 2.0\lambda = 400.0\text{ mm}$
 $d = 0$

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
 $d(\max) = 0.4631\lambda = 92.6208\text{ mm}$
 $d(\min) = 0.2131\lambda = 42.6208\text{ mm}$

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

