

2.25 Apply CD Module 2.4 to generate plots of the voltage standing-wave pattern for a 50- Ω line terminated in a load impedance $Z_L = (100 - j50) \Omega$. Set $V_g = 1$ V, $Z_g = 50 \Omega$, $\epsilon_r = 2.25$, $l = 40$ cm, and $f = 1$ 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

$Z_g = 50.0 + j 0.0 \Omega$
 $V_g = 1.0 + j 0.0$ V

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

$f = 1.0$ GHz
 $\lambda = 200.0$ mm

$Z_L = 100.0 - j 50.0 \Omega$

$d = 0.0 \lambda = 0.0$ m

$d = 2.0 \lambda = 400.0$ mm

$d = 0$

Set Line
Length units: ☐ [λ] ☒ [m]

Low Loss Approximation

Characteristic Impedance $Z_0 = 50 \Omega$
Frequency $f = 1E9$ Hz
Relative Permittivity $\epsilon_r = 2.25$
Line Length $l = 0.4$ [m]

Update

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

Update

Set Generator

$V_g = 1 + j 0$ 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 rad

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

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

