TD pour le chapitre 4

Exo1 :

A transmission line having a characteristic impedance of 75 Ω is delivering power to a 150-Ω load.

(*a*) Calculate the SWR on this line.

(*b*) Determine the minimum voltage reading on this line if the maximum voltage is 25 V.

SOLUTION

Given: $Z_0 = 75\ \Omega$

$Z_L = 150\ \Omega$

$V_{\text{rms max}} = 25\ \text{V}$

Find: (*a*) SWR (*b*) $V_{\text{rms min}}$

(*a*) Since SWR, VSWR, and ISWR are all equal, determination of one provides all three. From the equation relating SWR, Z_L, and Z_0,

$$\text{SWR} = \frac{Z_L}{Z_0}$$

$$= \frac{150}{75}$$

$$\boxed{\text{SWR} = 2{:}1}$$

(*b*)

$$\text{VSWR} = \text{SWR} = \frac{V_{\text{rms max}}}{V_{\text{rms min}}}$$

$$2 = \frac{25}{V_{\text{rms min}}}$$

$$V_{\text{rms min}} = \frac{25}{2}$$

$$\boxed{V_{\text{rms min}} = 12.5\ \text{V}}$$

Exo2 :

A sine wave having a frequency of 75 MHz is launched on a transmission line.

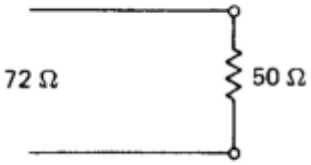
(*a*) How long does it take from the time that the instantaneous voltage is zero before a peak occurs at the launch point?

(*b*) How far along the transmission line has the leading edge of the wavefront progressed in this amount of time?

Assume the speed of electromagnetic waves on this line to be the same as in free space (3×10^8 meters/s or 186 000 miles/s).

Exo3 :

A 50-Ω load is being fed from a 72-Ω transmission line.



(*a*) What is the standing-wave ratio resulting from this mismatch?

(*b*) Determine the reflection coefficient resulting from this mismatch.

(*c*) What percentage of the incident power is reflected from the load?

(*d*) What percentage of the incident power is absorbed by the load?