

Problem 9.12 Assuming the loss resistance of a half-wave dipole antenna to be negligibly small and ignoring the reactance component of its antenna impedance, calculate the standing-wave ratio on a $50\text{-}\Omega$ transmission line connected to the dipole antenna.

Solution: According to Eq. (9.48), a half wave dipole has a radiation resistance of $73\text{ }\Omega$. To the transmission line, this behaves as a load, so the reflection coefficient is

$$\Gamma = \frac{R_{\text{rad}} - Z_0}{R_{\text{rad}} + Z_0} = \frac{73\text{ }\Omega - 50\text{ }\Omega}{73\text{ }\Omega + 50\text{ }\Omega} = 0.187,$$

and the standing wave ratio is

$$S = \frac{1 + |\Gamma|}{1 - |\Gamma|} = \frac{1 + 0.187}{1 - 0.187} = 1.46.$$
