

9.14 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 $50\ \Omega$ transmission line connected to the dipole antenna.

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

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

and the standing wave ratio is

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