**Problem 9.1** A center-fed Hertzian dipole is excited by a current $I_0 = 20$ A. If the dipole is $\lambda/50$ in length, determine the maximum radiated power density at a distance of 1 km.

**Solution:** From Eq. (9.14), the maximum power density radiated by a Hertzian dipole is given by

$$S_0 = \eta_0 \frac{k^2 I_0^2 l^2}{32 \pi^2 R^2} = \frac{377 \times (2\pi/\lambda)^2 \times 20^2 \times (\lambda/50)^2}{32 \pi^2 (10^{-3})^2}$$

$$= 7.6 \times 10^{-6} \text{ W/m}^2 = 7.6 \text{ } (\mu\text{W/m}^2).$$