

87. The source being isotropic means $A_{\text{sphere}} = 4\pi r^2$ is used in the intensity definition $I = P/A$, which further implies

$$\frac{I_2}{I_1} = \frac{P/4\pi r_2^2}{P/4\pi r_1^2} = \left(\frac{r_1}{r_2}\right)^2 .$$

- (a) With $I_1 = 9.60 \times 10^{-4} \text{ W/m}^2$, $r_1 = 6.10 \text{ m}$, and $r_2 = 30.0 \text{ m}$, we find $I_2 = 0.960(6.10/30.0)^2 = 3.97 \times 10^{-5} \text{ W/m}^2$.
- (b) Using Eq. 18-27 with $I_1 = 9.60 \times 10^{-4} \text{ W/m}^2$, $\omega = 2\pi(2000 \text{ Hz})$, $v = 343 \text{ m/s}$ and $\rho = 1.21 \text{ kg/m}^3$, we obtain

$$s_m = \sqrt{\frac{2I}{\rho v \omega^2}} = 1.71 \times 10^{-7} \text{ m} .$$

- (c) Eq. 18-15 gives the pressure amplitude:

$$\Delta p_m = \rho v \omega s_m = 0.893 \text{ Pa} .$$