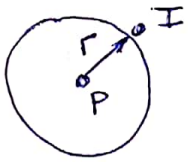
Problema 8. Ondas sonoras

$I = 1{,}2\ W/m^2$ a $r = 4\ m$

P = Potencia = ?

Suponiendo que se expande isotrópicamente.



$$\frac{\text{Potencia}}{\text{Area}} = \frac{P}{A} = \text{Intensidad}$$

$$I = \frac{P}{A} \rightarrow P = I \cdot A = 1{,}2\left(\frac{W}{m^2}\right)(4\pi r^2)$$

$$P = 1{,}2\left(\frac{W}{m^2}\right) \cdot 4\pi\, 4^2\,(m^2) = 241{,}15\ \text{Watt.}$$

Problema 9. Ondas sonoras

a) $r_1 = 50\ cm$
$r_2 = 200\ cm.$

$$I_1 = \frac{\Delta P_{m1}^2}{2\rho v} \quad ; \quad I_2 = \frac{\Delta P_{m2}^2}{2\rho v}$$

$$(1)\ \frac{I_1}{I_2} = \frac{\Delta P_{m1}^2}{\Delta P_{m2}^2}$$

pero $\frac{P}{A_1} = I_1$ y $\frac{P}{A_2} = I_2 \rightarrow A_1 I_1 = A_2 I_2$

$$(2)\ \frac{I_1}{I_2} = \frac{A_2}{A_1} \quad \text{en (1)} \rightarrow \frac{\Delta P_{m1}^2}{\Delta P_{m2}} = \frac{A_2}{A_1} = \frac{4\pi r_2^2}{4\pi r_1^2} = \frac{r_2^2}{r_1^2}$$

$$\frac{\Delta p_1^2}{\Delta p_2^2} = \frac{200^2}{50^2} = 16 \rightarrow \boxed{\frac{\Delta p_1}{\Delta p_2} = 4}$$

b) $r_1 = 50\ cm$
$r_2 = 100\ cm.$

$$\frac{I_1}{I_2} = \frac{A_2}{A_1} = \frac{4\pi r_2^2}{4\pi r_1^2} = \frac{100^2}{50^2} = 4$$

$$\boxed{\frac{I_1}{I_2} = 4}$$

c) $r_1 = 50\ cm$
$r_2 = 75\ cm$

$$\frac{\Delta p_1}{\Delta p_2} = \sqrt{\frac{r_1^2}{r_2^2}} = \sqrt{\frac{50^2}{75^2}} = 1{,}5$$

$$\boxed{\Delta p_{1m} = 1{,}5\,\Delta p_2}$$