Name : Solution   Id :   Sec. # :

A point source emits isotropic sound waves with a power of 30.0 W. A small detector of surface area 0.75 cm^2 is located 200.0 m from the source. Calculate the power transferred through the surface of the detector.

The power transferred
through the surface
of the detector P is

$$P = IA$$

$A = 0.75 cm^2$

$P_s = 30 W$

$r = 200 m$

But

$$I = \frac{P_s}{4\pi r^2} = \frac{30}{4\pi \times (200)^2} = 5.97 \times 10^{-5} \frac{W}{m^2}$$

Thus

$$P = IA = 5.97 \times 10^{-5} \times 0.75 \times 10^{-4}$$

$$\Rightarrow \boxed{P = 4.48 \times 10^{-9} W}$$