

Answer on Question#38567 – Physics – Acoustics

A bat flies at a steady speed of 4 m/s emitting a sound of $f = 90000$ Hz. It is flying horizontally towards a vertical wall. What is the frequency of the reflected sound as detected by the bat?

(Take velocity of sound in air as 330 m/s).

Solution:

Doppler Effect equation:

$$n' = \left(\frac{v + v_0}{v - v_0} \right) n = 90\text{kHz} \cdot \left(\frac{340 \frac{\text{m}}{\text{s}} + \frac{4\text{m}}{\text{s}}}{340 \frac{\text{m}}{\text{s}} - 4 \frac{\text{m}}{\text{s}}} \right) = 92\text{kHz}$$

Answer: the frequency of the reflected sound is 92kHz.