Answer on Question # 58263 – Physics – Mechanics | Relativity

A bat flying in a cave emits a sound and receives its echo 2.3 s later. How far away is the cave wall if the speed of sound is 343 m/s?

Solution:

We can neglect the own speed of the bat, since it is very small in comparison with the speed of sound.

The sound wave emitted by the bat travels to the cave wall, where it is reflected from the wall, and travels back to be received by the bat as an echo. Thus, the sound way travels twice the distance between the bat and the cave wall.

Therefore, the distance between the bat and the cave wall can be calculated as follows:

$$\mathrm{L} = \frac{\mathrm{wt}}{2} = \frac{343 \cdot 2.3}{2} = 394.45\left[\mathrm{m}\right],$$

where w is the speed of sound,

t is the time of the sound wave traveling.

Answer: 394.45 m.