Measuring speed of sound in the air lab report

parand samadi

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1 Introduction

Wave speed: In the case of a wave, the speed is the distance traveled by a given point on the wave in a given interval of time.

$$v = \lambda f$$

v= velocity
f= frequency
$\lambda = Wavelength$
Wave length: Wavelength is the distance between identical points in the adjacent cycles of a waveform signal propagated in space or along a wire.
Frequency: Frequency is the number of crests of a wave that move past a given point in a given unit of time. The most common unit of frequency is the hertz (Hz), corresponding to one crest per second. The frequency of a wave can be calculated by dividing the speed of the wave by the wavelength.
The wavelength and frequency of light are closely related. The higher the frequency, the shorter the wavelength. Because all light waves move through a vacuum at the same speed, the number of wave crests passing by a given point in one second depends on the wavelength. That number, also known as the frequency, will be larger for a short-wavelength wave than for a long-wavelength wave.
Resonance: Resonance is a phenomenon that occurs when a vibrating system or external force drives another system to oscillate with greater amplitude at a specific preferential frequency.
Standing waves: Standing wave is a wave in a medium in which each point on the axis of the wave has an associated constant amplitude. The locations at which the amplitude is minimum are called nodes, and the locations where the amplitude is maximum are called antinodes.

2 Materials

Water
Frequency generator
Ruler
Graduated cylinder

3 method

At the beginning, we pure specific amount of water inside the graduated cylinder and then we put the frequency generator up in a specific distance which we measure by ruler and using the following formulas, we can find the wave length and speed of the sound in the air.

$$L = \ell \div 4$$

$$V = \lambda f$$

We continued doing this measurement four times with different frequencies.

4 Calculations

First measurement:
f= 350 Hz

$$\lambda = 0.42$$

L= 0.420 m
V= (0.42)(350)=322 m/s
Second measurement:
h=0.72 m
f=485 Hz

$$\lambda = 0.68$$

V=330 m/s
Third measurement:
h=38 m

$$\lambda = 1.52$$

f= 223 Hz
v= (223)(1.52)=339 m/s
Forth measurement:
f=2.24 Hz

$$\lambda = 1.12$$

v=(1.12)(303)=345 m/s

5 Data

λ	v
0.42	322
0.68	330
1.52	339
1.12	345

6 Conclusion

In this lab, I could figure out the correlation between the water and the speed of sound and it proofed that the speed of sound is 340. Although I didn't get this number, the measurement was around this value.