

The speed of sound in air

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1 Introduction

The purpose of this lab is to measure the speed of sound in air by determining the wavelength of resonant sound waves in an air column of variable length. In this lab, sound waves will be generated by an Apple smart phone. The medium is room temperature air enclosed in a glass tube, sealed at the lower end by a column of water. When we turn on the phone, a train of waves consisting of alternate compressions and rarefactions in air is sent down the tube. This wave train is reflected at the water surface with a phase change of 180 degrees and passes back up the tube. At the open end of the tube, it is again reflected, but with no phase change in this case. We have to determine several effective lengths of the tube at which the resonance occurs for each vibration. Another objective of this lab was to determine the wave length of the wave for each vibration from the effective length of the resonance tube. Lastly, we will compare the measured speed of sound with the accepted value. My hypothesis is that the larger the frequency of the vibration, the lesser distance of the sound at its highest point

2 method

The materials needed for this lab was a tube, an Apple's smart phone, and water. We started off by filling part of the tube with water. Then my teacher turn on his phone and hold it over the top of the tube. Then we listening for the position of loudest sound. After finding the antinode we measured the distance from the top of the tube to the water surface and recorded that length. This process was repeated 3 more times with different frequency.

3 result

by using these formulas $v = 4 * L$ and $V = * f$ we came out with the data:

trial 1:

$f = 512 \text{ Hz}$

$L = 16,5 \text{ cm}$

trial 2:

$f = 384 \text{ Hz}$

$L = 22 \text{ cm}$

trial 3:

$f = 320 \text{ Hz}$

$L = 25 \text{ cm}$

trial 4:

$f = 220 \text{ Hz}$

$L = 38 \text{ cm}$

(the room temperture was 19C)

You can tell that when the period increases, the wavelength does as well. The only numbers that are actual are the frequency from the phone. The rest of the data is based on our hearing throughout the entire lab.

4 error

there could have been many errors in my lab like:

- the source of f
- the resonant chamber
- the location of mose of wave is hard to determine.

5 conclusion

This lab taught me more about resonance. I learned that speed of sound is changed according to the temperature in the room at the time.