Speed of Sound

PHYS 211L – H02

Tuesday 10:05am – 12:05pm

Abstract

In this lab, we determined the speed of sound in air at room temperature using a resonating air column. We adjusted the length of the air column and found various resonance lengths, and from out measurements, we found that the speed of sound in air at room temperature is 347.1 m/s.

Introduction/Background

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Procedure

Materials used: Tube, clamps, flexible tubing, water, a thermometer, water jug, meter stick, and two tuning forks.

First, we recorded the temperature of the room, which was 26°C. Then, we recorded the radius of the tube, which was 0.015 meters.

We filled the tube with water and then struck one of the tuning forks against the heel of someone’s hand. While holding the tuning fork approximately two centimeters from the open end of the tube with the tines perpendicular to tube’s axis, we began adjusting the water level, thus increasing the length of the air column. While doing this, we listened for sudden increases in sound intensity and, when found, we marked their location by placing a rubber band around the tube at the height of the water and measured that distance from the top of the tube. We did this two more times and then repeated the process with the other tuning fork.

HERE’S THE FOOKIN’ DIAGRAM:

Results/Analysis/Physics

There’s sum fisiks n stuff

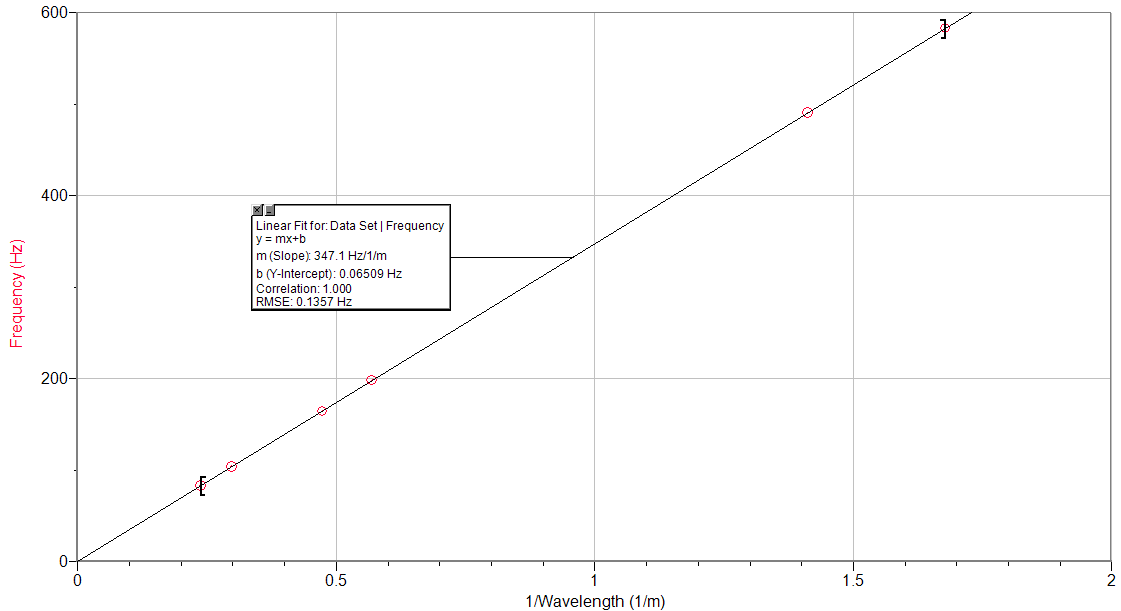
Measurements

|  |  |  |  |
| --- | --- | --- | --- |
| Tuning Fork 1 Resonance Lengths (m) | Tuning Fork 1 Wavelengths (m) | Tuning Fork 2 Resonance Lengths (m) | Tuning Fork 2 Wavelengths (m) |
| 0.168 | 0.708 | 0.14 | 0.596 |
| 0.52 | 2.116 | 0.43 | 1.756 |
| 1.04 | 4.196 | 0.83 | 3.356 |

Frequencies

|  |  |
| --- | --- |
| Tuning Fork 1 (Hz) | Tuning Fork 2 (Hz) |
| 490.254 | 582.383 |
| 164.036 | 197.665 |
| 82.722 | 103.504 |

Graph of Frequency vs. 1/Wavelength



Conclusion

Lab Questions

2. From the slope of the graph, we found that the speed of sound is 347.1 m/s. From the given formula v(T) = (331.5 +0.6T), and from our measured value of T = 26°C, we found that v = 347.1 m/s. These values are identical.

3. The speed of sound in air decreases as the temperature decreases. Our measurements would change to reflect this. How exactly would they change? ¯\\_(ツ)\_/¯

4. Well, I guess you’d be finding the speed of sound in water instead of air. That would probably change some things.

5. Well if you’re on the Moon you’re certainly not finding the speed of sound in air. Or maybe you are and I’m somehow that dumb.

References