Class: Physics II, Dates: Lab performed 2/24/2023

Lab #6: Introduction to Sound Waves.

by

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1. **Objective:** To understand the frequency and waves lengths.

2. **Introduction**:

Air is moved by the sounds of speech. Articulation is the process of causing air to move in ways that can be heard such as vibrating, popping, or swishing in order to create sound. For the sake of this introduction, we shall concentrate on the patterns of vibration that occur in voiced sounds, notably vowels. It is possible to make a tuning fork vibrate by striking it against a table or another hard object. The times of the fork will vibrate at specific rate, or frequency, depending on the exact form being used. As the tuning fork's ends vibrate, they cause the air particles near to them to vibrate as well, following the see back and forth motion as the tuning fork ends. In turn, these moving air particles alternately push and pull on the particles next to them, as well as those adjacent to them and so on. As a result of this movement, the pattern of vibration spreads outward from the tuning fork like ripples on the surface of water. Sound waves are the moving patterns of vibration that cause these patterns to move. Sound waves reach our ears (or a microphone) and cause the eardrum (or the membrane in the microphone) to vibrate in the same manner as the waves that originated in our ears. The vibrations inside the ear cause nerve impulses to be sent to our brains, which are interpreted as sound by our ears.

3. Apparatus and materials

- Diapason/tuning fork
- Cup of water
- Ruler
- Camera/calculator

fig. 1

4. Procedure and results

f (HZ)	λ	l (mm)	f_i/f_1	$(l_1/l_i)^2$
256	**1.34**	**105**	**1**	**1**
288	**1.19**	**100**	**1.13**	**1.10**
326	**1.05**	**95**	**1.27**	**1.21**
341	**1.00**	**87**	**1.33**	**1.44**
384	**0.89**	**85**	**1.50**	**1.52**
426	**0.81**	**80**	**1.66**	**1.72**
480	**0.72**	**77**	**1.88**	**1.85**
512	**0.67**	**75**	**2.00**	**1.96**

Where f_1 =256HZ and l_1 = 105mm.

5. Conclusion

The outcome of this experiment where the values we calculate were close to the ones obtained from the analysis of $\boldsymbol{f \propto 1/l^2}$. We have practiced how to calculate the frequency and the length of the waves.

6. Question

If the velocity of a wave is 401m/s and the λ=0.87. What will be the frequency of the wave?

$$v = \lambda f = f = \frac{v}{\lambda} = \frac{401}{0.87} = 460.9HZ$$