Student's Name

Professor's Name

Course

Date

Lab Report: Relationship between the Frequency and Wavelength of a Vibrating String

Introduction

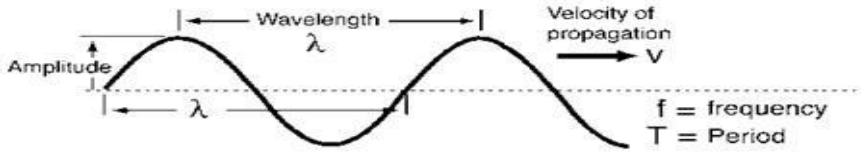
The relationship between the frequency and the wavelength of a vibrating string was observed in the lab through an online simulation program.

Objectives

The main objective of this experiment was to establish the relationship between the frequency of vibration and the wavelength.

Background Theory

When an object is vibrating or oscillating, it does so at a certain frequency; the number of waves produced in a vibrating or oscillating object per second (Oguz & Andrea 301). It is measured in Hertz. The wavelength is the distance between two points that are identical in a wave (Zijun 625). This can be the distance between two crests in a wave or two troughs, as illustrated below.



Equipment

1. Simulation software: An online software called Phet found at the following link: https://phet.colorado.edu/sims/html/wave-on-a-string/latest/wave-on-a-string_en.html
2. Octave Online: A MatLab online software.

   https://octave-online.net/

Procedure

The Phet online software was opened in Google Chrome. The wave for the string was set to oscillate while the end of the string was removed. The tension on the string was set to medium and the wave's amplitude was set to 1cm. The ruler was turned on to be used in measurements. The frequency values were changed and the wavelengths recorded in table 1. The graph of the relationship between frequency and wavelength was plotted in Matlab.

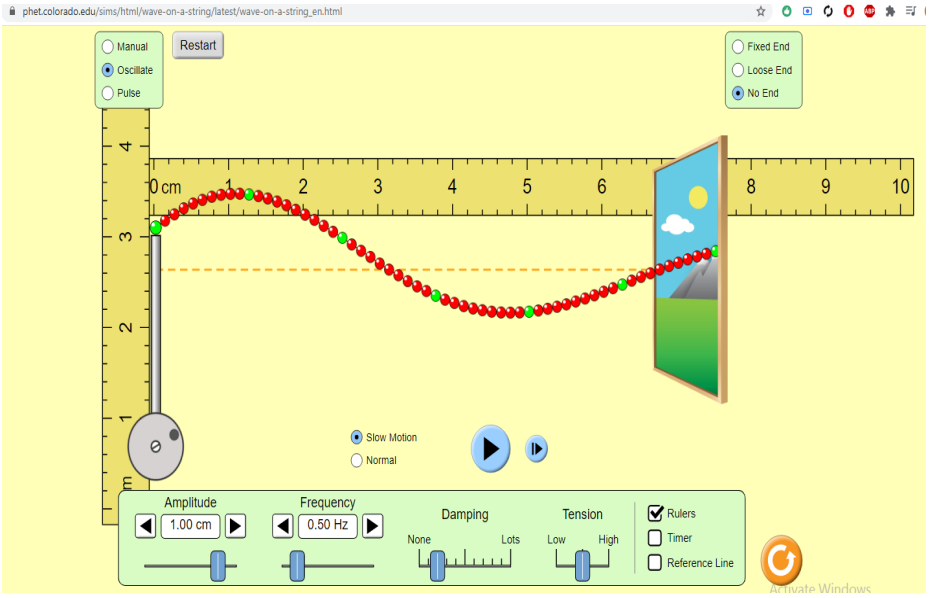


Image of the Phet simulation.

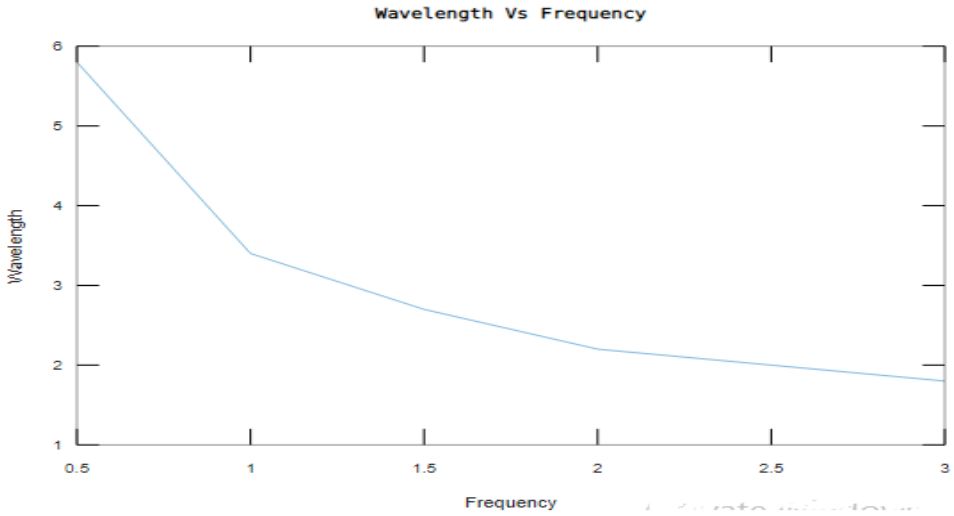
Results

The results were tabulated in table 1 below.

Frequency (Hz)	Wavelength (cm)
3	1.8
2	2.2
1.5	2.7
1	3.4
0.5	5.8

Table 1: Frequency and Wavelength Values

The following graph was obtained from Matlab.



The code used to obtain the graph in Matlab is given below.

```
x=[0.5,1,1.5,2,3];

y=[5.8,3.4,2.7,2.2,1.8];

plot (x,y);

title ('Frequency Vs. Wavelength');

xlabel('Frequency');

ylabel('Wavelength').
```

Calculations and Discussion

From the results obtained, tabulated, and graphed in the results section, it was observed that an increase in the frequency led to a corresponding decrease in the wavelength. This is also clearly illustrated by the graph of wavelength against frequency. For example, there was a decrease of 5.8 -3.4 = 2.4 cm in the wavelength when the frequency was increased from 0.5 to 1 Hz.

Conclusion

The experiment's main objective was achieved, as the relationship between the frequency and the wavelength in a vibrating string was observed. It can be concluded that the wavelength decreases when the frequency is increased.

Works Cited

Oğuz H. N., and A. Prosperetti. “The Natural Frequency of Oscillation of Gas Bubbles in Tubes.” *The Journal of the Acoustical Society of America*, vol. 103, no. 6, 1998, pp. 3301–3308., doi:10.1121/1.423043.

Yan, Zijun. “General Thermal Wavelength and Its Applications.” *European Journal of Physics*, vol. 21, no. 6, 2000, pp. 625–631., doi:10.1088/0143-0807/21/6/314.