

WavesLab

Purpose

- To study and analyze the wave properties of a spring and determine the relationship between tension and waves speed.

Materials

- Tension springs
- Slinky/spring
- Meter stick
- Timer/stopwatch

Procedure

1. Measure the mass of your spring in kg.
2. Stretch the spring. Record the distance of the stretched spring. Be as precise as possible.
3. Record the tension in the spring.
4. Send a pulse down the spring two times and record how long it takes for each trip. Take an average to obtain t_{avg} .
5. Repeat steps 1 - 4 to have a total of ten distances that cover a wide range of tensions (you should be able to increment tensions at regular intervals).
6. Take general notes on what happens to the wave as it propagates. (For example, observe if the velocity or amplitude change as the pulse travels along the spring.)

Calculations/Analysis

1. Place the data into then Excel file named Waves_Lab_Results_2015.xlsx.
2. What do you notice about the relationship between stretch distance and time it takes the wave to travel that distance?
3. Looking at your data, does the wave speed increase or decrease as the tension is increased?
4. Include the graph from the Excel file. Theoretically that slope should equal one. Calculate your percent error using:

$$\% \text{ error} = \frac{|Theoretical - Experimental|}{Theoretical} \times 100\%$$