



## Wave Motion

## Lab #17

**Discussion:** We have learned in class that there are two main types of waves and an additional combination of these two types of waves (a surface wave). We have learned that EMR waves do not require a medium, but mechanical waves do require a medium. In this lab we will use a spring to model the two main types of waves.

**Purpose:** To observe how waves travel in a spring.

**Hypothesis:** Once a wave passes a point on the spring, the spring should return to its original position.

**Theory:** The two kinds of mechanical waves are longitudinal, where vibration is parallel to the motion of the wave, and transverse, where the vibration is perpendicular to the motion of the wave.

**Materials:**

spring toy                      meter stick

**Method and Data Collection:**

1. Work with two people holding each end of the spring. Place the spring on the floor and stretch it about 25% more than its resting length. *Do not overstretch the spring. Stretching it too far will ruin the spring.*
2. Have one partner pull a small part of the spring either left or right. Let the pulled part go and observe the motion of the spring. What happens when the disturbance reaches the other end of the spring? Make a sketch to record your observation.
  
3. Have the other partner move their end of the spring back and forth on the floor. Draw a wave diagram that shows your observations.
  
4. Repeat step 3 but move the spring back and forth at a faster rate (two or three times faster). Record your observations.  
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5. Squeeze about 10 cm of the spring into a compression. Release the compression and make a wave diagram that records your observations in the space below.

**Analysis:**

1. Name the type of waves generated by the back and forth motion and those generated by a compression.

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2. Identify each type of waves generated in steps 2 and 3 as longitudinal or transverse. Explain your answer.

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3. Compare the original wave from step 2 of the procedure to the wave that came back.

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4. What happened to the wavelength and frequency of the wave when the speed of the back and forth motion used to generate the wave increased (as in step 4).

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5. How could you change the amplitude of the waves you generated in steps 3 and 4?

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6. Identify each type of waves generated in step 5 as longitudinal or transverse. Explain your answer.

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**Conclusions:**

1. Have the instructor stretch the spring slightly and generate a transverse wave. Stretch the spring a little more and generate a transverse wave in the tighter spring. Describe any changes in the wavelength and frequency of the waves

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