

Lab 11: Simple Harmonic Motion

Simple harmonic motion occurs many times in nature (light waves, water waves, sound waves, pogo sticks, Ferris wheels, ...). This lab will begin to show you some of the basic ideas of SHM.

Bouncy Spring 1

1. Turn the photo-gate to 'pend.' This is short for pendulum.
2. Position the photo-gate so that it can measure the time of the period.
3. Hang your mass hanger.
4. Oscillate the mass through the photo gate (ensure that the mass goes through on both the up and down path).
5. Using the equation derived at the beginning of lab, calculate the spring constant of your spring.

Bouncy Spring 2

1. Turn the photo-gate to 'pend.' This is short for pendulum.
2. Position the photo-gate so that it can measure the time of the period.
3. Hang 700 grams on your mass hanger.
4. Measure the length of the stretched spring.
5. Oscillate the mass through the photo gate (ensure that the mass goes through on both the up and down path).
6. Using the equation derived at the beginning of lab, calculate the spring constant of your spring.
7. Add 200 grams to the mass hanger.
8. Measure the new length of the stretched spring.
9. Measure the new period of oscillation.
10. Calculate the spring constant (k) using Hooke's law. ($\Delta F = -k \cdot \Delta x$)
11. Calculate the percent error of the pendulum equation.

$$Factor \equiv \frac{Final}{Initial}$$

$$\%error \equiv \frac{|Truth - Test|}{Truth}$$

Swinging pendulum (short string)

1. Position the photo-gate so that it can find the time of the period.
2. Turn the photo-gate to 'pend.' This is short for pendulum.
3. Hang 700 grams on your mass hanger
4. Using the equation derived at the beginning of lab, calculate the length of your string.
5. Repeat steps 3 and 4 with 200 grams on the mass hanger.
6. Measure the length of two strings and calculate the percent error for each case.

$$\text{Factor} \equiv \frac{\text{Final}}{\text{Initial}}$$

$$\%error \equiv \frac{|\text{Truth} - \text{Test}|}{\text{Truth}}$$

Swinging pendulum (long string)

1. Position the photo-gate so that it can find the time of the period.
2. Turn the photo-gate to 'pend.' This is short for pendulum
3. Hang 700 grams on your mass hanger
4. Using the equation derived at the beginning of lab, calculate the length of your string.
5. Repeat steps 3 and 4 with 200 grams on the mass hanger.
6. Measure the length of two strings and calculate the percent error for each case.

$$\text{Factor} \equiv \frac{\text{Final}}{\text{Initial}}$$

$$\%error \equiv \frac{|\text{Truth} - \text{Test}|}{\text{Truth}}$$