Title: Hooks Law Lab Report

Abstract

Hooks Law describes the relationship between force and the stretch of a string. This lab report will investigate the Newton's Laws and characteristics of spring. The spring will extend linearly to the amount of force. As a result of adding force more than need, the spring will reach its elastic limit. Resulting in damaged spring. If more force is added, the spring will break.

Introduction

This experiment will investigate the elasticity of a spring and its properties to determine if they fit the existing criteria. Using data and graphs, we will be able to understand the elastic point and the breaking point of a spring. A successful experiment will show that the spring obeys the Hooks law.

Hooke's law is an approximation of the response of elastic bodies. F = -ax. The force is directly proportional to displacement.

Newton's 3rd Law: Whenever one object exerts a force on another object, the second object exerts an equal and opposite on the first.

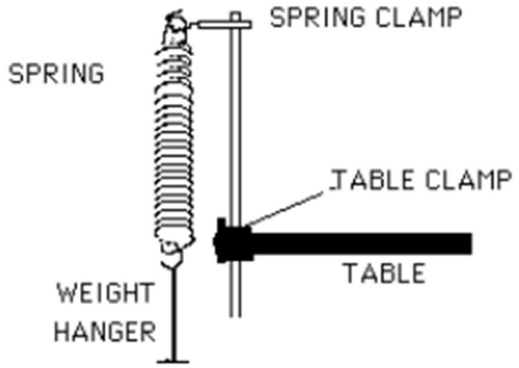

Figure 1

Hypothesis

The spring will extend linearly with the amount of force added to it.

Materials

For this lab, we will need the following:

1. Weighs (1 N x 6 pieces)

2. Weight hanger
3. Meter stick
4. Balance
5. Spring
6. Rod & table clamps
7. Spring clamp

Safety Notes:

- **Be sure to keep your feet out of the area in which the masses will fall if the spring breaks.**
- Be sure to clamp the ring stand to the lab table, or weight it with several books so that the mass does not pull it off the table.
- You need to hang enough mass to the end of the spring to get a measurable stretch, but **too much force will permanently damage the spring**.

Procedure:

1. Assemble the apparatus as shown in the Diagram 1 below. Be sure to clamp the ring stand to the lab table, or weight it with several books.

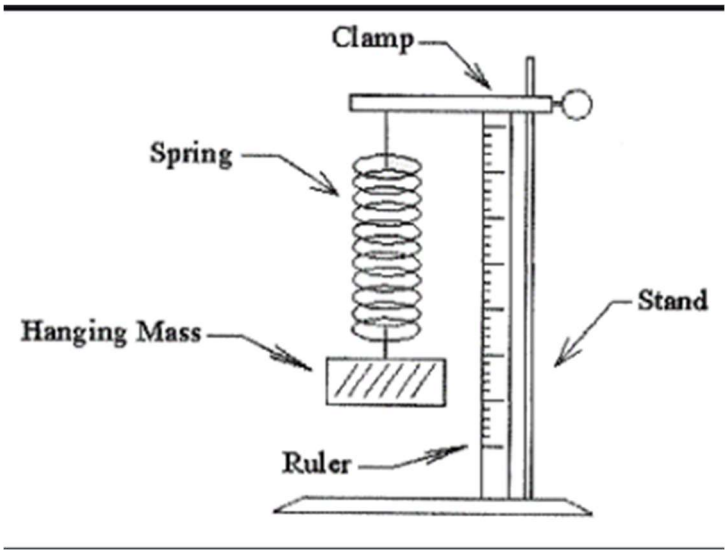

Diagram 1

2. Construct a data table. You will need to record the mass that you hang from the spring and the displacement of the spring (stretch). From this, calculate the spring constant using the equation below. You should allow for at least 6 trials.

$$F = - Ky$$

3. Repeat the process 6 times.

Data

Trial	Force (N)	Stretch (cm)
1	1.00	0.120
2	2.00	0.180
3	3.00	0.270
4	4.00	0.365
5	5.00	0.420
6	6.00	0.510

Graph

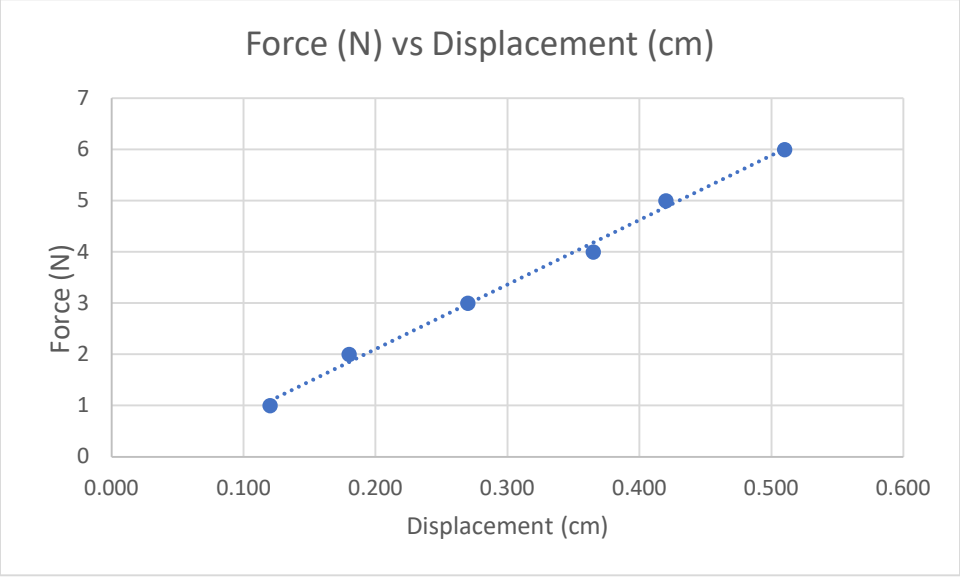

Figure 2: Graph: Force vs Displacement

Results

As the force increases on the spring, the displacement of the spring also increases. The spring returns to its original position if the elastic limit is not exceeded, after elastic limit is exceeded, the spring does not return to its original position.

Discussion

Analysis of results

The results of the experiment obeyed hook's law. Which states that if the force on the spring increases, the displacement of the spring increases linearly. The spring extended linearly to the amount of force added. As expected, the spring did not return to its original position after surpassing the elastic limit.

Ways to improve

There are many ways to improve in this experiment. Increasing the number of trials means increased number of results for spring constant. Resulting in a better approximation of the spring constant.

Using smaller masses with bigger range of masses will provide a variety to the experiment. Which includes the boarder limits, excluded limits, and included data. This will ensure the experiment has been tested with all types of masses.

Conduct the experiment using different types of spring. Different spring means to have different types of spring constant. Different spring constant will verify the experiment by providing new results on displacement and the amount force need to displace the spring.

Conclusion

Hooke's Law states that the stretch of a spring is directly proportional to the applied force. (Engineers say, "Stress is proportional to strain".) In symbols, F = kx, where F is the force, x is the stretch, and k is a constant of proportionality. If Hooke's Law is correct, then, the graph of force versus stretch will be a straight line.

This purpose of the experiment is to determine the force that a spring can undertake depending on its spring constant. The spring constant is used by engineers to determine the spring's application. Higher spring constant means stiffer springs.

Reference

The Spring Constant.

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