A Project Report

on

"Verification of Hook's law"

Submitted by

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Under the guidance

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Academic year (2022-23)

DECLARATION

I hereby declare that the project report titled " Verification of Hook's law" have completed successfully towards the partial fulfilment for the award of the degree "BACHELOR OF PHYSICAL SCIENCE from "TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FORWOMEN, RAJANNA SIRICILLA .This is the bonafide work undertaken by me which is not submitted to any other university or institution for the award of any degree / diploma.

Date: 9-8-2022
Place: Thangallapally

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CERTIFICATE

This is to certify that the project report title " Verification of Hook's law" submitted in partial fulfillment for the award of degree of B.SC programme of department of Physics was carried out by Anjumalika (220771044681025), Avinasha (220771044681015), Saraswathi (220771044681023), Nandhini (220771044681010). This has not been submitted to any other institute or university for the award of any degree.

Signature of the guide

Principal

Project report on Verification of Hook's law

Aim:

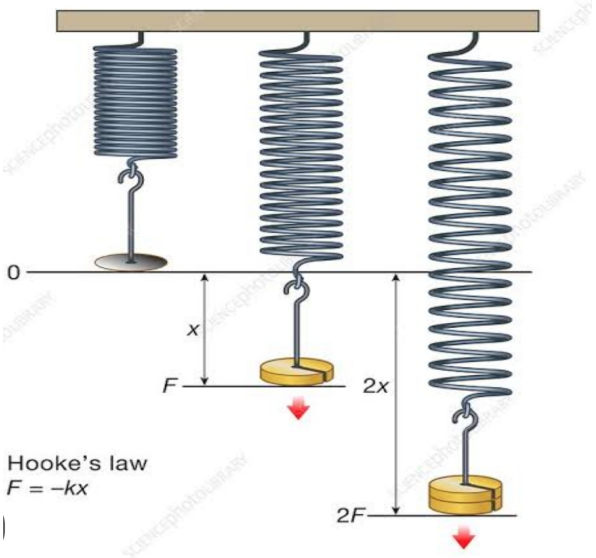
To verify the Hook's law

Objectives of the project:

The primary objective of a project on Hooke's Law would likely include understanding and demonstrating the relationship between the force applied to an elastic object and the resulting extension or deformation.

Principle:

Hooke's law states that the strain of the material is proportional to the applied stress within the elastic limit of that material.



Theory:

To deform a material requires the application of a force. Some materials deform more easily than others. Materials that return to their original dimension after deforming force has been removed are called elastic. All materials exhibit some degree of elasticity but not always in enough quantity to be useful from a practical sense. The elasticity property makes its presence

known through a restoring force that opposes the deformation force and tries to maintain the original dimensions of the material. We will be considering elasticity in only one dimension. There storing force is proportional to the magnitude of the deformation. This can be expressed in an equation known as Hooke's Law after the discover of the effect, Robert Hooke

$$F=-kx$$

The variable 'x' represents the magnitude of the distortion or displacement from the equilibrium as exhibited in the stretching of a spring or rubber band. The factor 'k' is the proportionality constant and the minus sign indicates that of the displacement, i.e. it is a restoring force.

Materials required :

- Slotted weights
- Balance
- Coil spring
- Weight hanger
- Rod & Table
- Clamp
- Rubber band
- Meter stick
- Spring clamp

Procedure:

1. Suspend the spring vertically,
2. Clamp the scale vertically, close to the spring,
3. Attach the hanger to the lower end of the hanging spring,
4. Record the position of the lower end of the mass hanger,
5. Hang a weight from the spring using the hanger and wait for the spring to come to rest,
6. Record the final position of the lower end of mass hanger,
7. Repeat 5 and 6 above until at least 7 recordings are made,
8. Remove a weight from the hanger and wait for the spring to come to rest,
9. Record the final position of the lower end of mass hanger,
10. Repeat 8 and 9 above until at least 7 recordings are made, i.e. reverse 5 and 6 above.

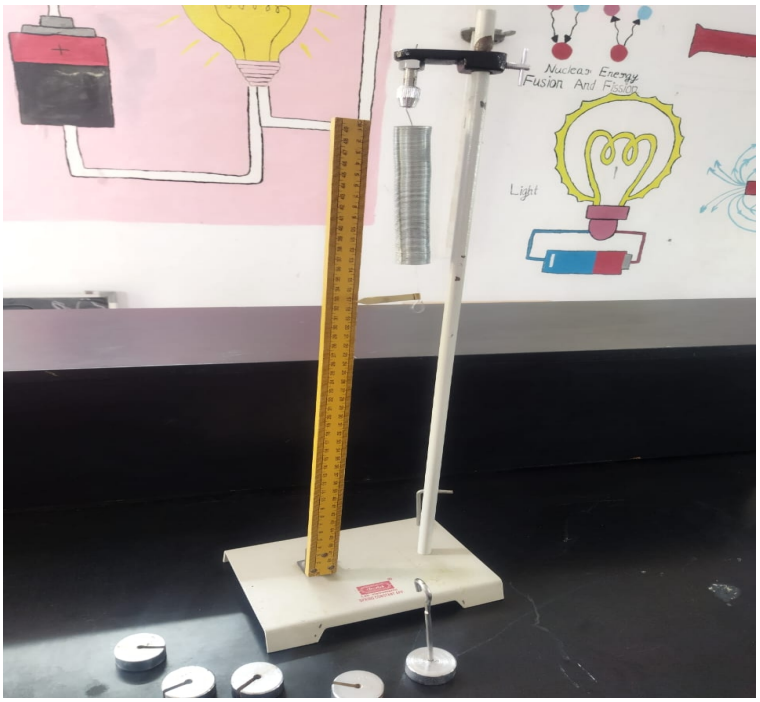


Fig: Students finding readings in laboratory

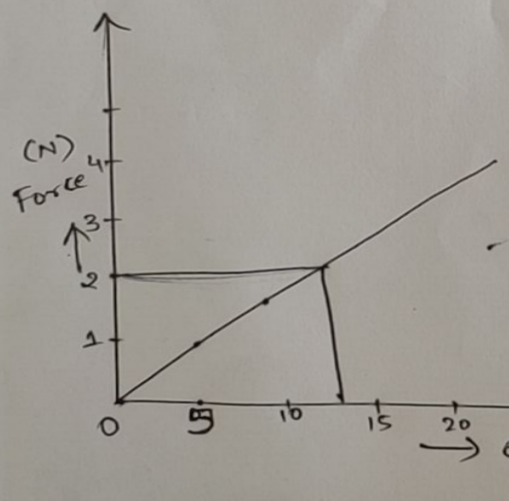
Observations:

Least count of vertical scale = 0.1 c

Table for load and extension:

Table for load and extension

S.NO	Mass (gr)	Reading of the scale		Extension
		Loading	Unloading.	
1	50 gr	56 cm	48cm	8cm
2	100 gr	65 cm	48cm	17
3	150 gr	73 cm	48 cm	25
4	200 gr	81 cm	48 cm	33
5	250 gr	89 cm	48 cm	41
6	300 gr	97 cm	48cm	49



$F = -Kx$

$500N = -K \times 0.28$

$K = \frac{500}{0.28}$

$K = 1785.7\ N/m$

CALCULATION

From graph,

k = 1785.7 N/m

PRECAUTIONS

1. Loading and unloading of weight must be done gently.

2. Reading should be noted only when tip of pointer comes to rest.

3. Pointer tip should not touch the scale surface.

4. Loading should not be beyond elastic limit.

SOURCES OF ERROR

1. The support may not be rigid.

2. The slotted weights may not have correct weight (20g).

RESULT

The force constant of the given spring is 1785.7N/m