Experiment report examples

Law

Oscillatory Motion

Introduction

The purpose of the experiment was to evaluate the spring constant of a spring connected to mass and to determine the effect of varying mass on the period of oscillation. It was hypothesized that the increase in mass would lead to increase in the period of the oscillating spring.

Theory

Hooke's Law

According to Hooke's law, the restoring force (F) of a stretched spring is proportional to its extension (x) (Mansfield and Colm, 39).

$F \infty x$

$F = - k x$

Where F is the restoring force, x is the extension and k is a constant of proportionality called spring constant.

The negative sign indicate that the direction of restoring force is opposite that of extension.

A graph of F against x is a straight line graph whose gradient is equal k which is the spring constant.

Simple Harmonic Motion

The period of an oscillating spring attached to a mass (m) is given by T = 2 π ().

T2 = 4π2

A graph of T2 against m is a straight line graph whose gradient is given by;

Therefore, k = (4π2)/k

Part 1

Materials

- Helical spring
- Mass hanger
- Stand and clamp
- Assorted masses
- Meter rule
- Balance

Procedure

The spring was suspended on the clamp with its pointer aligned to the meter rule. The position of the pointer (Xo) was recorded. The mass of mass hanger was determined and recorded. The mass hanger was hanged from the bottom end of the spring and known mass loaded on it. The new position of the pointer (Xi) was determined and recorded. The displacement (x) was calculated by subtracting Xo from Xi. The suspended mass was found by adding the mass of mass hanger and the known mass. These values were recorded. The procedure was repeated for other masses.

Results

Graph

Analysis

The equation of the line is given by y = 0. 1723x - 0. 0390

The gradient = 0. 1723

Therefore, 0. 1723kg/m = k

Spring constant in SI = 1. 689N/m

Discussion

Part 2

Materials

Materials

- Helical spring
- Stand and Clamp
- Assorted masses
- Weight hanger
- Stop watch
- Balance

Procedure

The set up for part 1 of the experiment was maintained. A known mass was loaded into the mass hanger. The spring was given a small displacement and the time taken for 20 oscillations was determined and recorded. The procedure was repeated for other remaining masses.

Results

Graph

Analysis

The equation of the line above is given by y = 1. 9494x + 0. 5474

The gradient = 1. 9494

1. 9494 =

Therefore, k = 39. 4887 ÷ 1. 9594

20. 26N/m

Discussion

The value of spring constant found in part 1 differed from the value obtained in part 2 by 18. 571N/m. Given that the measurements in part 1 of the experiment were direct and prone to less error, the value of 1. 689N/m was deemed the most accurate value for the spring constant. This was also supported by the fact that the uncertainty in part 2 which was higher than the uncertainty in part 1 of the experiment. The uncertainty was 3. 5%.

Conclusion

The hypothesis was upheld because the period of oscillation increased when the mass was increased. All the observations in part 1 and 2 of the experiment were consistent with theory of spring constant and simple harmonic motion.

Work cited

Mansfield, Michael, and Colm O'Sullivan. Understanding Physics. Hoboken, N. J: Wiley, 2010. Print.