Friction: determination of s and k report sample

GROUP

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Lab section: PHY 122/Line # XXXX/Time Slot: XX pm – YY pm

Abstract

Contact forces occur when two surfaces interact and are in direct contact. These forces can either be normal, which is described as being perpendicular to the surface; and friction, which is parallel to the contact surface and is also known as the force that resists motion, slowing down objects as they move about. There are two types of frictional forces: the static friction force (fs) which is the force that acts on an object at rest to prevent it from sliding; and kinetic friction force (fk) which acts on the object in motion. In this experiment, the coefficients of both types of frictional forces were determined by using a force sensor attached to a wooden block with varying weights on top of them. Results obtained were:

Objective: To measure the coefficient of static (μs) and kinetic friction (μk) between the surface of a wooden block and the laboratory table; and to check if the collected experimental data fit the normal distribution curve.

Equipment:

- Weights
- Wooden Block
- Force Sensor
- Data Studio
- Experimental Setup

Procedure

- Calibrate the force sensor prior to experimentation

- Open the Data Studi program: Labs/PHY 122/Friction

- Hang the sensor from the provided stand

- In the Data Studio program, choose “ Setup”, then “ Calibrate Sensor”, then “ 2-Point Calibration”.

- With nothing hanging from the sensor, set the first value in Data Studio to zero, then press the “ Tare” button on the force sensor itself, and finally select “ Read from Sensor” in Data Studio.

- Put a 1. 00 kg mass to hang from the sensor. Set the second value in Data Studio to 9. 81, select “ Read from Sensor”

- Check your calibration by taking 40 seconds of data with the 1. 00 kg mass hanging from the sensor. You should see a line with a zero slope at 9. 81 N

- For the experiment proper, first use two weight of the wooden block and make runs for 40 short pulls. Record the tension in the pulling string during each pull.

- Remove one weight and repeat the previous step.

Results

Results for the calculation of the coefficients of static and kinetic friction are presented in Table 1. There are no units for the coefficients as the units cancel out during the calculation of values. Meanwhile, histograms constructed are presented in Figure 1 and Figure 2.

Figure 1. Histogram for the kinetic friction force Figure 2. Histogram for the static friction force

Data Analysis

fs, ave= 1. 5900

σfs = 0. 2126

fs, ave ± σ fs = 1. 5900 ± 0. 2126

fs, ave± 2 σ fs = 1. 5900 ± 0. 4252

M = 563. 5g = 0. 5635kg

G = 9. 81 m/s2

μs = 0. 2880 ± 0. 007

fk, ave= 1. 0823

σfk = 0. 1322

fk, ave± σfk = 1. 0823 ± 0. 1322

fk, ave± 2σfk = 1. 0823 ± 0. 2644

M = 563. 5g = 0. 5635kg

G = 9. 81 m/s2

μk = 0. 1960 ± 0. 0044