**PHY 151**

**LAB TITLE: Centripetal Acceleration**

**EXPERIMENT#: 13**

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**TEAM: # 2**

**DATE PERFORMED: 4/18/2017**

**DATE DUE: 4/25/2017**

**INSTRUCTOR: Dr. C. Berger**

1. **INTRODUCTION/OBJECTIVES**

* To determine the centripetal acceleration of a spinning mass.
* To determine the centripetal force.
* To compare the centripetal force to centripetal acceleration and velocity.

1. **EQUIPMENT**

* Various masses
* Spring
* Timer/stopwatch
* Spinning apparatus
* Pulley
* Lab booklet for data
* Calculator
* Ruler
* Mass Hanger
* Triple beam balance

1. **THEORY/EQUATION**

In this lab experiment our objective is to use a set of data to be able to calculate and compare centripetal acceleration, velocity and centripetal force. We will use the data provided to calculate the percent error within our data. In my opinion we will record data that is within a 10% reach of each other. We will be using the following equations.

* Centripetal acceleration: V^2/ R
  + V: velocity
  + R: axis center to post
* Velocity: N(2(pi)R)/ Delta T
  + N: Revolutions
  + R: axis center to post
  + Circumference: (2(pi)R)
  + Delta T: change in time
* Percent Difference: |Fcep-Fsp|/((Fcep+Fsp)/2)
  + Fcep: Centripetal acceleration
  + Fsp: Centripetal Force

1. **EXPERIMENTAL PROCEDURE**
2. Choose a mass to attach on the spring and on the end of the apparatus.
3. Record the mass and the distance from the center to the desired point.
4. Then with the help of your lab partners spin the mass until it has reached the desired point.
5. Now that it has reached the desired point count 10 revolutions and record the time it takes with a stopwatch.
6. Do this for 3 trials.
7. Now add a suspended mass and record its weight.
8. Repeat steps 1 – 5.
9. The data that has been collected can now be used to fill out the data sheet and well as calculate a percent error.
10. **DATA TABLE/GRAPHS**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Data table for first suspended mass m1 = .4535** | | | | | | | | |
| **Trial** | **N** | **T** | **R** | **V = (n2piR)/t** | **Fc=m1(v2/r)** | **Total mass(M)** | **Fs = Mg** | **Percent Difference between Fs and Fc** |
| 1 | 10 | 5.55 | .163 | 1.845 | 9.474 | .850 | 8.339 | 12.75% |
| 2 | 10 | 5.58 | .163 | 1.835 | 9.373 | .850 | 8.339 | 11.6% |
| 3 | 10 | 5.90 | .163 | 1.736 | 8.383 | .850 | 8.339 | .6% |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Data table for second suspended mass m2 = .5535** | | | | | | | | |
| **Trial** | **N** | **T** | **R** | **V = (n2piR)/t** | **Fc=m1(v2/r)** | **Total mass(M)** | **Fs = Mg** | **Percent Difference between Fs and Fc** |
| 1 | 10 | 6.29 | .163 | 1.628 | 9.002 | .850 | 8.339 | 7.6% |
| 2 | 10 | 6.29 | .163 | 1.655 | 9.300 | .850 | 8.339 | 10.9% |
| 3 | 10 | 6.29 | .163 | 1.600 | 8.700 | .850 | 8.339 | 4.5% |

\*\*SEE ORIGINAL DATA SHEETS ATTACHED AT THE END\*\*

1. **CONCLUSION**

As we witnessed in the experiment, centripetal force is a sum of other forces that act upon an object that cause that object to move in a circular path. The extensive data recorded and the calculations provided clearly support this theory and indeed proves it. There was a total of 6 trials performed. At the end of this lab it can be certain that a definite measurement is nearly impossible to get. While this is true the data is no far enough off to make a significant difference. Even though this lab had a very high margin of error, it was an effective way to demonstrate and test circular motion. The results show a noteworthy difference in forces, but it can all be accounted for by error. It was concluded that after experimentation, the procedures herein support the equations presented earlier.