

Experimental General Physics for Engineers I

Laboratory Report PHYS 192 spring 2022

Section: L06_____

Experiment name:

Static equilibrium

Student Name:	Talha Abdullah Punjabi	Student ID	201903446
---------------	------------------------	------------	-----------

Date submitted:	8/4/2022
-----------------	----------

Table of results (1.25 pts)	
Graph (1.25 pts)	
Data analysis (2 pts)	
Discussion (0.5 pt)	
References	
Others	
Report Grade (5 pts)	

1. Tables of results (Put correct units in the table)

1.1. Part 1

$$m = 100g = 0.1kg$$

$$R_2 = 12 \text{ cm} = 0.12m$$

$$\theta = 90$$

R_1 (m)	$u(R_1)$ (m)	F_2 (N)	$u(F_2)$ (N)	$\tau = R_2 F_2$ (N * m)
0.12	± 0.001	0.98	± 0.01	0.1176
0.09	± 0.001	0.71	± 0.01	0.0852
0.06	± 0.001	0.44	± 0.01	0.0528
0.03	± 0.001	0.21	± 0.01	0.0252

1.2. Part 2

$$R_1 = 9 \text{ cm} = 0.09m$$

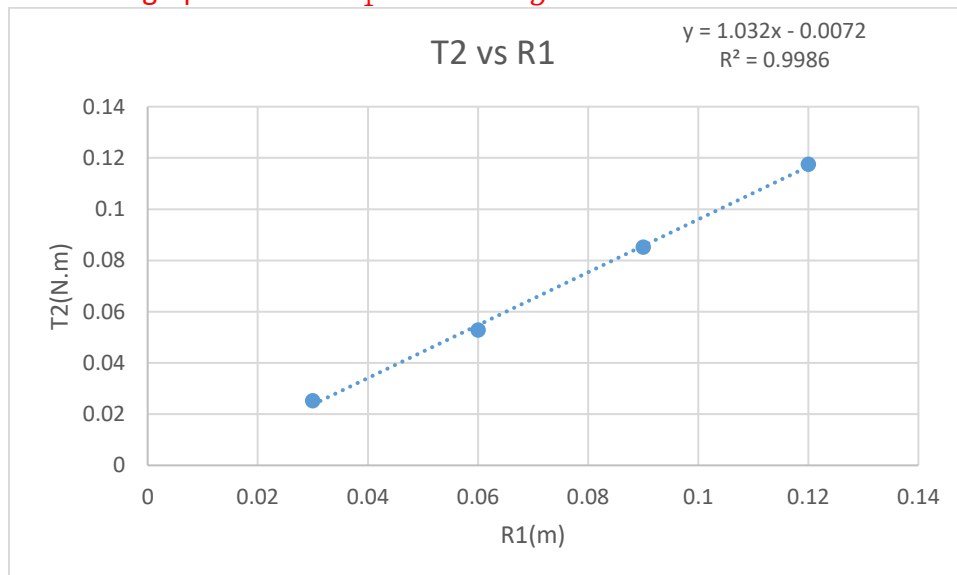
$$R_2 = 6 \text{ cm} = 0.06m$$

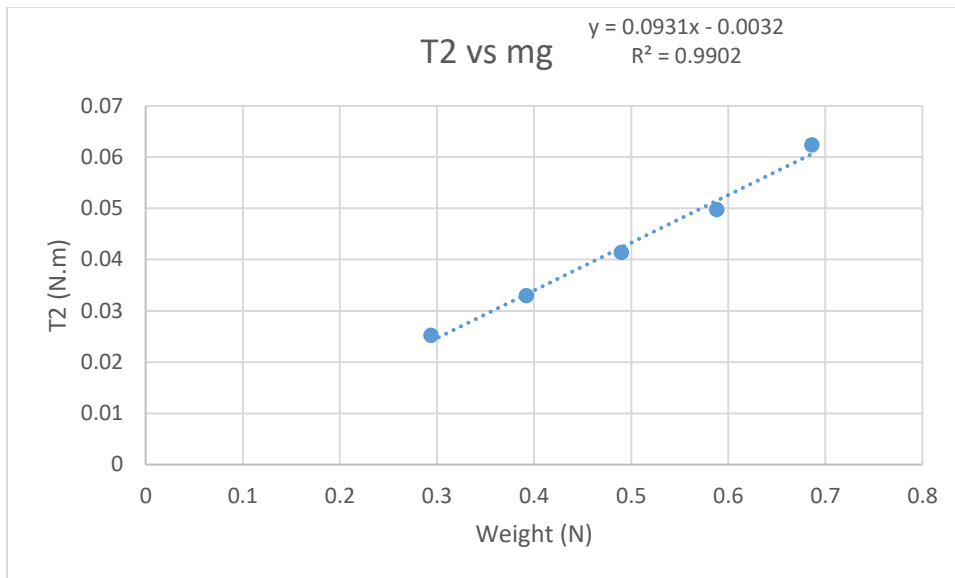
$$\theta = 90$$

M (kg)	Mg (N)	F_2 (N)	$u(F_2)$ (N)	$\tau = R_2 F_2$ (Nm)	$u(\tau)$ (Nm)
0.03	0.294	0.42	± 0.01	0.0252	0.000732
0.04	0.392	0.55	± 0.01	0.0330	0.000814
0.05	0.49	0.69	± 0.01	0.0414	0.000914
0.06	0.588	0.83	± 0.01	0.0498	0.001024

2. Graphs

Insert the graphs of τ vs. R_1 and τ vs. mg here





3. Data analysis

3.1. Error of τ

$$\begin{aligned}
 U(\tau) &= \sqrt{(R2 \cdot U(F2))^2 + (F2 \cdot U(R2))^2} \\
 &= \sqrt{(0.06 \cdot 0.01)^2 + (0.42 \cdot 0.001)^2} \\
 &= \pm 0.000732 \text{ Nm}
 \end{aligned}$$

3.2. Slope, intercept and their uncertainties

Give the values for the slope, intercept of your graphs and their uncertainties

For the first Graph

Slope(N): 1.032
Slope Error(N): 0.027713

Intercept (N.m) -0.0072
Intercept Error (N.m) : 0.002277

For the Second Graph

Slope(m): 0.093061
Error Slope(m): 0.005337

Intercept (N*m) -0.00324
Intercept Error(N*m) - 0.002718

3.3. Compare the value of the slope you obtained in the two parts with the expected value.

$|\text{Theoretical value} - \text{obtained value} / \text{theoretical value}| \cdot 100$

Part 1:

$$T = mg \quad R1$$

$$\text{Slope} = mg$$

$$\text{Slope} = 1.032 \quad mg = 0.1 \cdot 9.81 = 0.981 \text{ N}$$

$$\text{Error} = |0.981 - 1.032 / 0.981| = 5.19\%$$

Part 2:

$T = R1 \text{ mg}$ $\text{slope} = R1$
 $\text{Slope} = 0.093$ $R1 = 0.09$
 $\text{Error} = |0.09 - 0.093 / 0.09| = 0.3\%$

4. Discussion

The theory was satisfied, and the results obtained are with reasonable error percentages.

Reasons of error could be human error with experiment especially when the angle is measured, also trying to keep it 90 in both parts. Some angle changes could cause some errors.

Overall, the experiment is successful with low error percentages for both the parts

References