Experimental General Physics for Engineers I

Laboratory Report PHYS 192 spring 2022

Section: __L06___

Experiment name: # Hooke's law

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Date submitted:	3/9/2022

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. Table of results (put the correct units in the table)

1.1. Static method

Object total mass m (kg)	Object weight mg (N)	$u(mg)$ (N)	Spring extension x_o (m)	$u(x_o)$ (m)
0.05	0.490	0.0098	0.036	±0.001
0.10	0.981	0.0098	0.077	±0.001
0.15	1.471	0.0098	0.122	±0.001
0.20	1.962	0.0098	0.167	±0.001
0.25	2.452	0.0098	0.207	±0.001

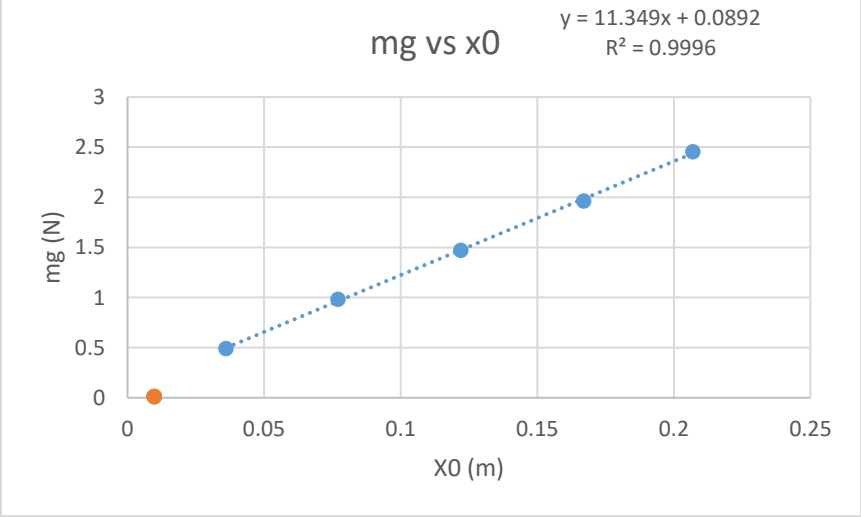
1.2. Dynamic method

Object Mass m (kg)	Time of 5 Oscillation					T (s)	$u(T)$ (s)	T^2 (s^2)	$u(T^2)$ (s^2)
	t_1 (s)	t_2 (s)	t_3 (s)	Tav (s)	$u(tav)$ (s)				
0.05	4.34	4.24	4.19	4.257	0.044	0.4256	0.0044	0.18110	0.0037
0.10	5.38	5.49	5.41	5.427	0.032	0.5426	0.0033	0.2944	0.0035
0.15	6.45	6.42	6.46	6.443	0.0120	6.4433	0.0012	0.4151	0.0015
0.20	7.4	7.38	7.46	7.4123	0.0240	7.4133	0.0024	0.5495	0.0035
0.25	8.69	8.68	8.67	8.68	0.0057	8.6800	0.00058	0.7534	0.0010

2. Graphs.

2.1. Plot mg vs x_o (static).

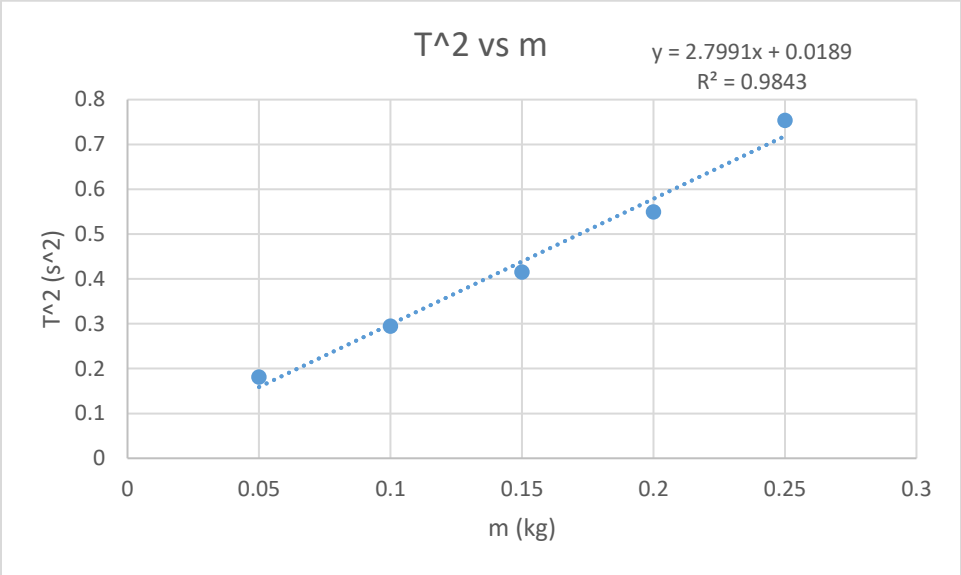
Insert the graph here.



2.2.

Plot T^2 vs. m (dynamic).

Insert the graph here.



3. Data analysis

3.1. Slope and intercept of the first graph, static, and their uncertainties.

Slope=11.34906 N/m Intercept= 0.089185 N

Slope Intercept= 0.139013 N/m Intercept Error= 0.018943 N

3.2. Slope and intercept of the second graph, dynamic, and their uncertainties.

Slope= 2.799104 s^2/kg Intercept= 0.018903 s^2

Slope Error= 0.204336 s^2/kg Intercept error= 0.033885 s^2

3.3. Value of K and its error (static)

K=slope

K=11.34 N/m

U(K)= ±0.1390 N/m

K= 11.34 ± 0.1390 N/m

3.4. Value of K and its error (dynamic)

T^2=4 (pi)^2/ slope

=4 (pi)^2/2.799

=14.103

U(K)=root(d(4(pi)^2/slope/d(slope)*U(slope))^2 = -4(pi)^2*0.204 /2.799^2= ±1.03

K= 14.103 ± 1.03

3.5. Comparison

Compare the values of K obtained from the static method and the dynamic method.

Percentage of difference= |k1-k2/(k1+k2)/2)|*100=21.7%

4. Discussions

(give a brief comment on whether yours results are in agreement with what was expected or not. If it is not try to give a possible explanation).

The results agree with what was expected with both values of K with an error percentage of 21.7% between the two values.

The percentage of error is increased due to some errors such as human error when taking measurement of X0 and when timing the dynamic isolation. Another possible reason could be the inaccuracy and inconsistency of the mass of the object attached to the spring.

References