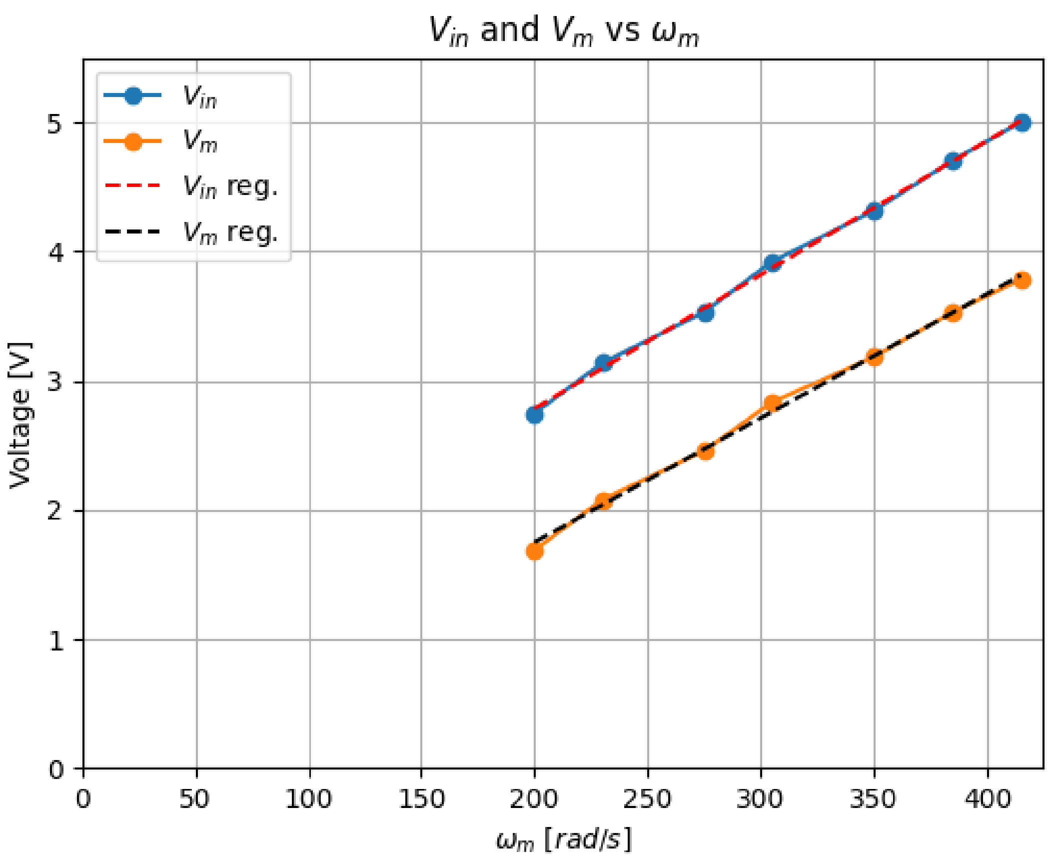
LE 6.1 – DA32435 – Dyab Asdi – 19305

TA: Mobina Tavangarifard

1)



Graph	Slope	Intercept	R^2
V_i	0.010358825741654316	0.711125367785324	0.9981568036180684
V_m	0.009610110059066876	-0.173242364444838	-1.1396937010507142

Since the slope of the Vm vs motor speed graph gives us r_m:

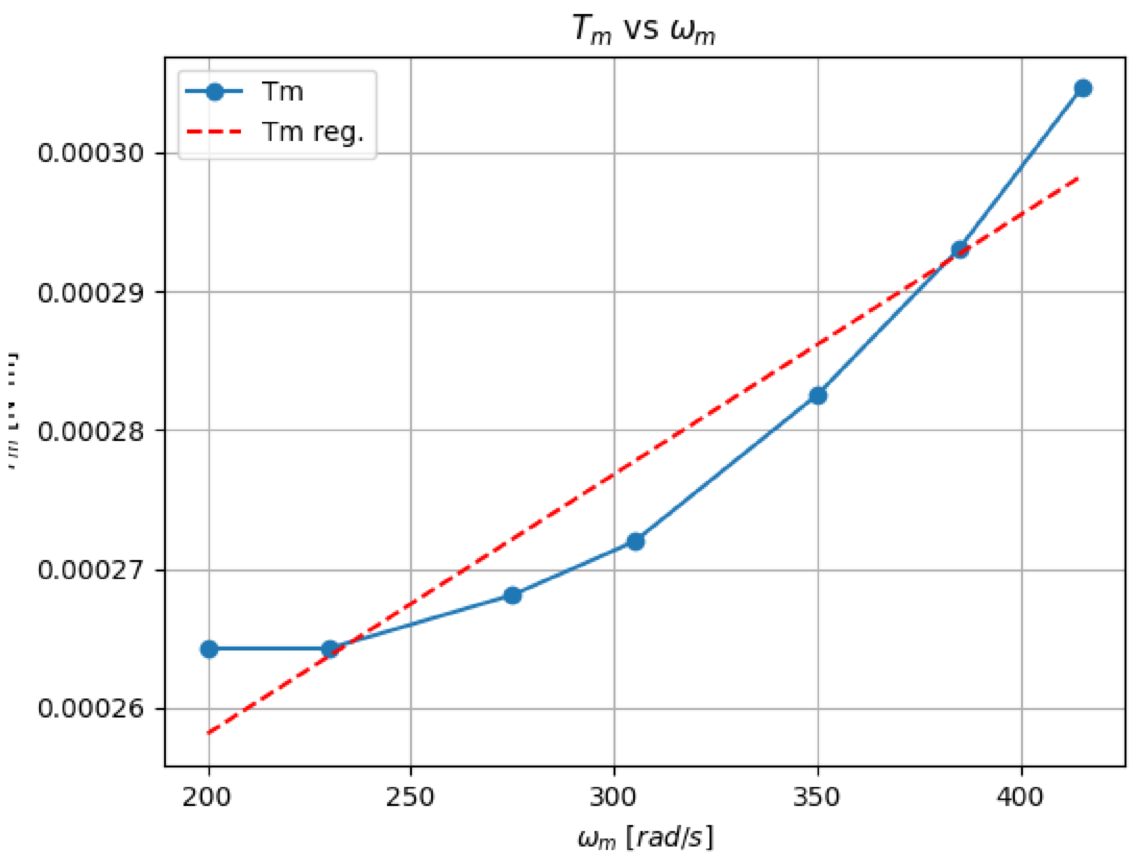
$$r_m = 9.61011 \times 10^{-3} \frac{V \times s}{rad}$$

<u>Measured Values from experiment:</u>

Minimum PWM value = between 45-50

$$R_m = 38.5\ \Omega$$

2)



Graphing Torque vs Motor Speed, the slope provides us with the dampening value, B_m. The intercept provides us with the coulombic torque, T_c.

Graph	Slope (B_m)	Intercept (T_c)	R^2
T_m	1.8688935357e-07	0.00022074990232	0.903840260594617

Therefore,

$$B_m = 1.8688935357 \times 10^{-7} \frac{N \times m \times s}{rad}$$

$$T_c = 2.2074990232 \times 10^{-4} \, N \times m$$

3)

Using the following relationship, I created multiple Torque-Speed plots for different input voltages:

$$T_0 = \frac{r_m}{R_m} \times v_{in,rated} - \left[\frac{r_m^2}{R_m} + B_m\right] \times \omega_m$$

Since the X and Y intercepts of the Torque-Speed lines are known, we created the plots by solving for the X intercepts (when $T_m = 0$) and Y intercepts (when $\omega_m = 0$).

We had already solved all the variables in the equation from previous parts of the lab. After creating 3 different pairs of X and Y intercepts utilizing existing arrays for $v_{in,rated}$ and the other variables, I plotted the points, and displayed them on the graph below: