

ELEC 3724
Experiment Report

Experiment #2

DC Motors

Date Performed: March 04, 2020

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Team:

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Objectives:

The objectives for this lab involved finding and understanding the open circuit characteristics, as well as the load characteristics of a DC Generator while operating as different executed modes.

Part A: Preparation, Induction Machine

I_F	0mA	100mA	200mA	300mA	400mA	500mA
V_t (V) Increasing	0	24.45	47.4	65.4	76.6	82.9

Table 39. Armature terminal voltage measurement (increasing).

Part B: Open Circuit Characteristic Curve (OCC):

I_F	0mA	100mA	200mA	300mA	400mA	500mA
V_t (V) Decreasing	1.16	25.45	48.7	66.5	77.3	82.9

Table 40. Armature terminal voltage measurement (decreasing).

Part C: Voltage Characteristics for a Self-Excited Shunt Generator:

	No load voltage
V_t (V)	76.5

Table 41. No load voltage measurement

	200 Ω	100 Ω	75 Ω	50 Ω	33.3 Ω	25 Ω	12.5 Ω
I_{out} (A)	0.36	0.73	0.93	1.43	2.10	2.65	4.85
V_t (V)	75.4	74.1	73.4	72.0	70.3	68.6	61.5

Table 42. Load test.

Part D: Voltage Characteristics for a Separately-Excited DC Generator:

	Field Voltage V_{PS} (V)	Armature Voltage V_t (V)
No load	72.4	76.5

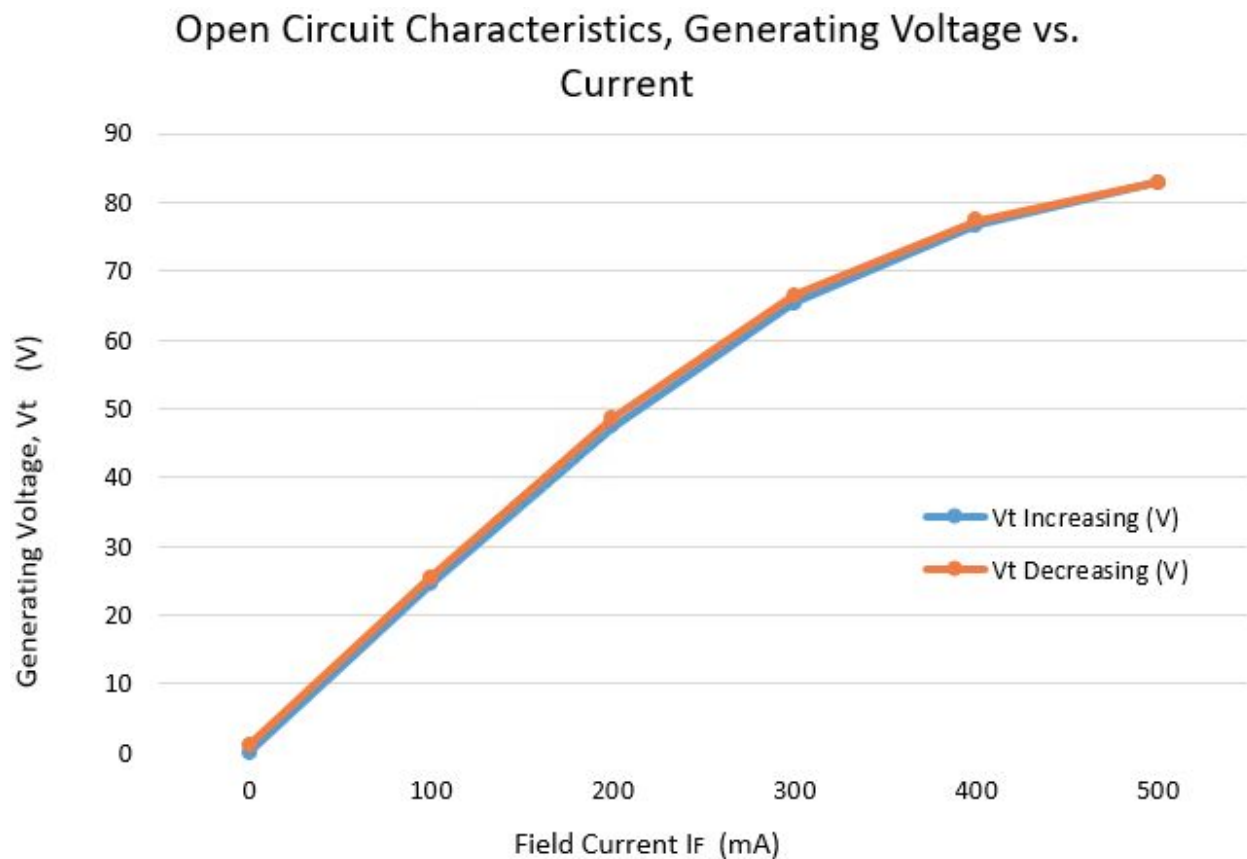
Table 43. Voltage Measurement

	200 Ω	100 Ω	75 Ω	50 Ω	33.3 Ω	25 Ω	12.5 Ω
I_{out} (A)	0.3	0.69	0.89	1.36	2.03	2.62	5.12
V_t (V)	74.5	73.5	72.9	72.0	69.9	69.8	65.9

Table 44. Load test.

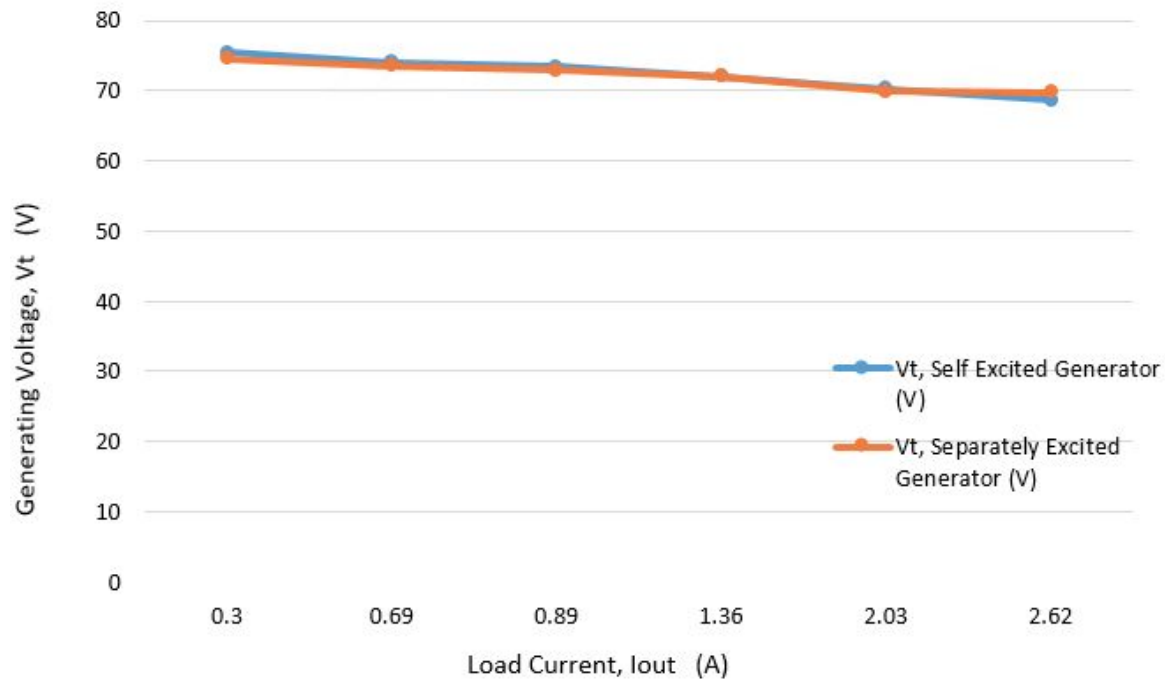
Report Questions:

1. Plot the open circuit characteristics (V_t increases and decreases) of Part B on the same graph. Use field current as the X-axis and generating voltage as the Y-axis.



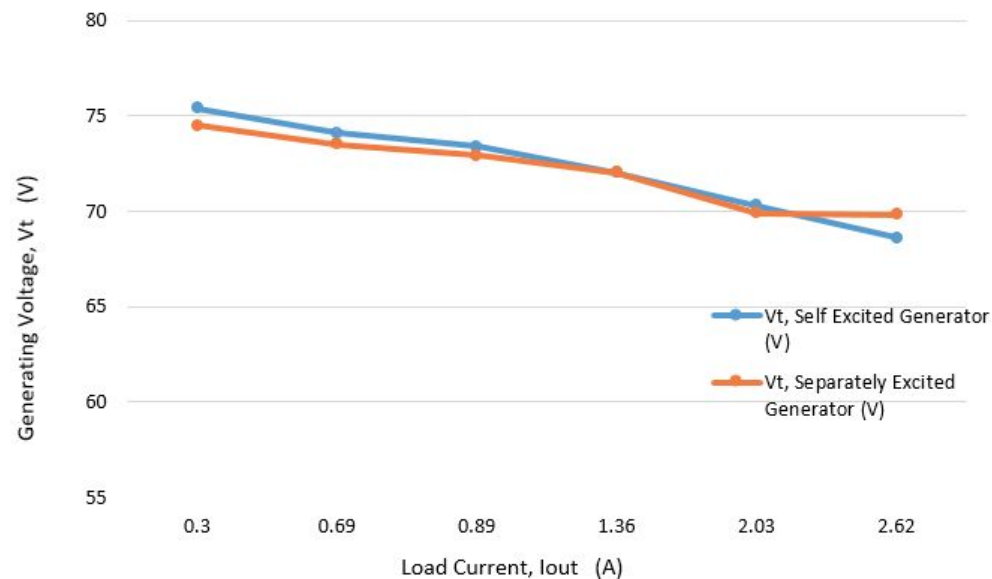
2. Plot the voltage characteristics of Part C and D on the same graph. Use load current as the X-axis and generating voltage as the Y-axis.

Voltage Characteristics of Part C and Part D:



Same graph as above, but zoomed in for clarity:

Voltage Characteristics of Part C and Part D:



Conclusion:

In this lab we examined an open circuit characteristic curve, the voltage characteristics of a self excited shunt generator, and the voltage characteristics of a separately excited DC generator. In performing this lab, we applied our gathered data to several plots in order to fulfill the report questions, as required by the lab manual. From the generated graphs regarding the tables in part B (open circuit characteristic curve), it seems as though when the field current (I_f) increased from zero, the Voltage (V_t increasing) levels were slightly less than the voltage levels (V_t decreasing) when field current was backed off from 500 mA.

Regarding the line plots for part C, as well as part D, the voltage (V_t) for the separately excited machine exhibited lower values, in general, until the resistance became equal at a resistance value of 50 ohms. After achieving an equal value to the self-excited generator at 50 ohms, the separately excited generator again exhibited lower voltage values until reaching a resistance of 25 ohms, whereby the separately excited machine, then, exhibited a greater value than the self excited machine.

Overall, this lab fulfilled its' purpose to garnish my understanding of an open circuit characteristic curve, as well as the voltage characteristics of a self excited shunt generator, and the voltage characteristics of a separately excited DC generator.