Lab 8: DC Generators
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Abstract

In this experiment, the basic principles of operation of DC generators were studied. The output voltage (V_T) and output current current (I_L) relationship for separately excited, shunt, and compound generators were studied under various loads.

Results

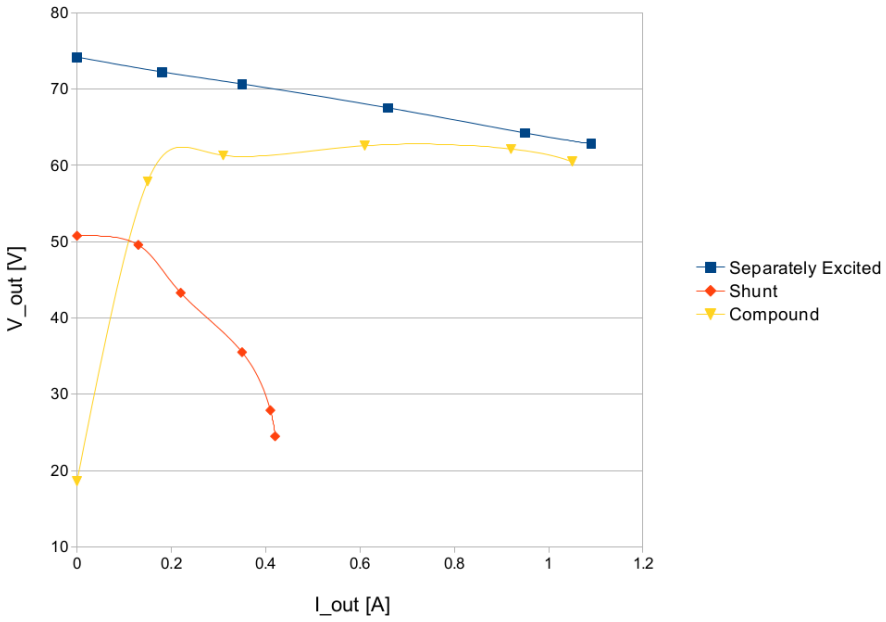

Figure 1: **Comparison of Terminal Characteristics**

Conclusions

The terminal characteristics for DC motors are induced torque and speed; for DC generators they are terminal voltage and line current. Figure 1 shows a comparison of the terminal characteristics of a separately excited, shunt, and compound generators.

The terminal characteristics of a separately excited generator are linear, following $V_T = E_A - I_A R_A$. As the load increased, the line and armature currents (I_L and I_A) increased, decreasing V_T, as the internal generated voltage (E_A) is independent of I_A.

A shunt generator behaves similarly, except that the field current (I_F) is proportional to V_T. As I_F decreases V_T, flux, and E_A also decrease. This causes I_A to increase, which decreases V_T further, so the relationship is not quite linear.

The terminal characteristics of a compound generator consist of two opposing terminal voltages, following $V_T = E_A - I_A(R_A + R_S)$. As the load increased, I_L and I_A increased. Since I_A increases, the total magneto-motive force increases, which increases the flux, which increases E_A, which increases V_T.