

Magnetization characteristic

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Magnetisation Curve

Problem Statement

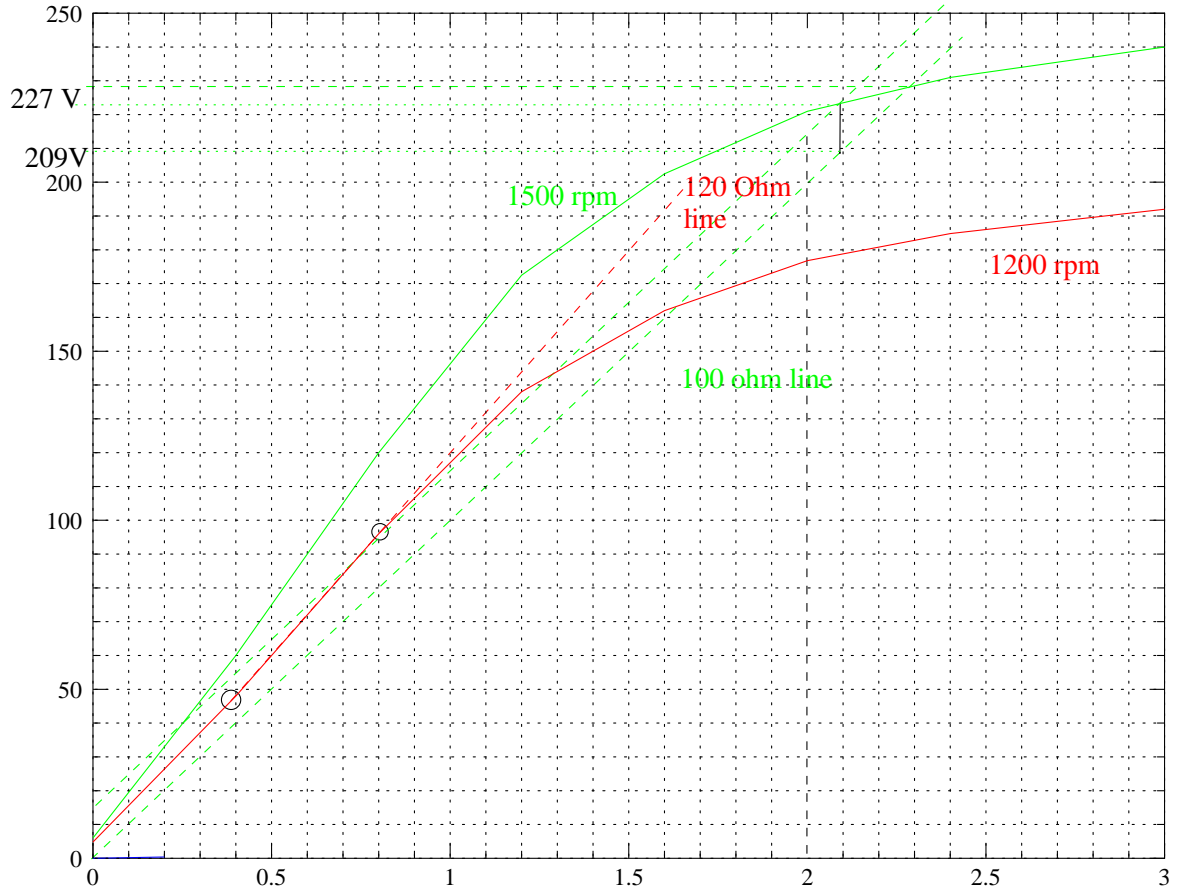
Plot a magnetization curve for a dc generator from the following data:

I_f	0	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.0
E_a	06	60	120	172.5	202.5	221	231	237	240

For this generator running at 1500 r.p.m., obtain graphically:

1. Open circuit voltage for a total shunt field resistance of 100 ohm.
2. Critical resistance value @ 1200 r.p.m.
3. The terminal voltage of the generator if the total armature resistance is 0.3 ohm,
4. Armature current is 50 A @ 1500 r.p.m. neglecting armature reaction.

Solution



From the graph above,

1. Green curve is for 1500 rpm. Plotted from the data given.
2. Red curve is plotted (1200 rpm) after we multiply the E_a values by 0.8.
3. A line with slope 100 ohm is drawn from origin.
4. It intersects the 1500 r.p.m. curve at point **A**.
5. Here the value of voltage is 233 V. **This is the open circuit voltage at 1500 r.p.m.**

6. $E_{a1200} = 0.8 * E_{a1500}$
7. Plot the 1200 r.p.m. curve (here red).
8. Draw a line tangential to the lower part of the red curve.
9. Measure the slope of the tangent. Here it is 120 Ohm. **This is the critical resistance.**
10. The armature voltage drop is $50 * 0.3 = 15$ Volts.
11. Draw a line parallel to the 100 ohm line with offset of 15 Volts on vertical axis.
12. The line cuts the green curve at 231V point.
13. Project vertically on the 100 ohm line from this point.
14. The voltage at this point is 216 Volts. **This is the on load voltage at 1500 r.p.m.**