



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 19EC309 ELECTRICAL MACHINES AND POWER SYSTEMS

II YEAR / 03 SEMESTER MECH & MCT

Unit 1 – DC Machines

Speed Control of DC Motor



Introduction

- A single motor can be used for different speeds for different works.
- Smooth speed control is possible in DC shunt motor.
- $N \propto (E_b / \phi) = [k(V - I_a R_a) / \phi]$



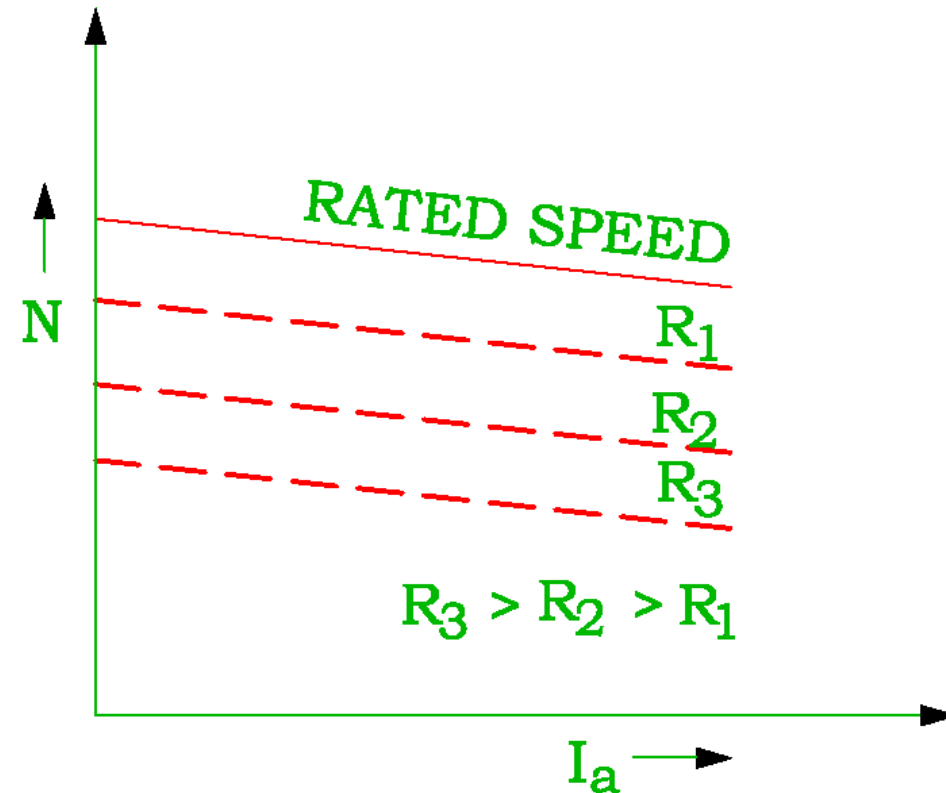
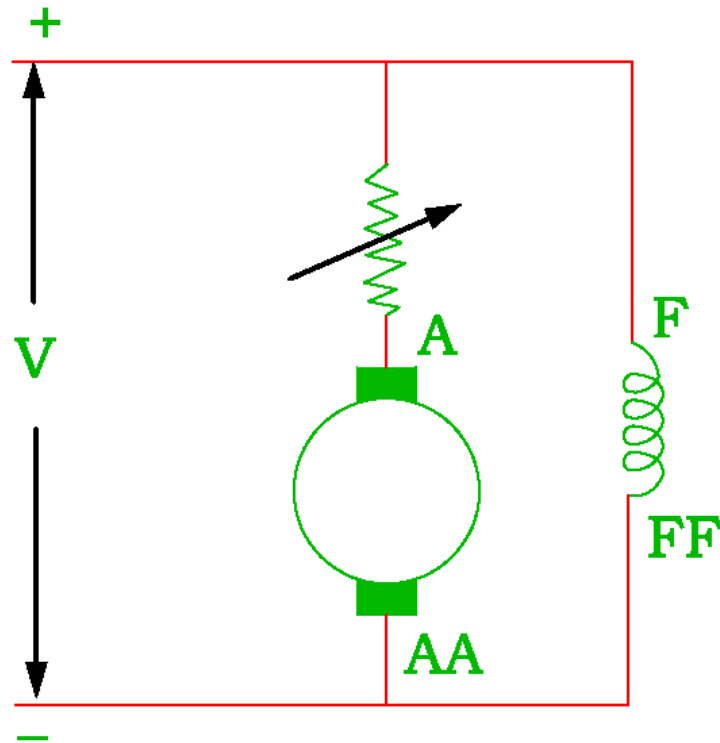
SPEED CONTROL OF DC SHUNT MOTOR

- (i) Armature Control Method – By changing the resistance in the armature by using rheostat control.
- (ii) Field (or) Flux Control Method – By changing the field flux.
- (iii) Voltage Control Method – By Varying the applied voltage.



(i) Armature Control Method

- Variable Resistance is connected in series with armature circuit.
- $N \propto [v - I_a(R_a + R)] / \phi$
- By increasing R , the potential drop across the armature is decreased.
- This applicable only for speed less than rated speed.





Advantages:

- Simple method

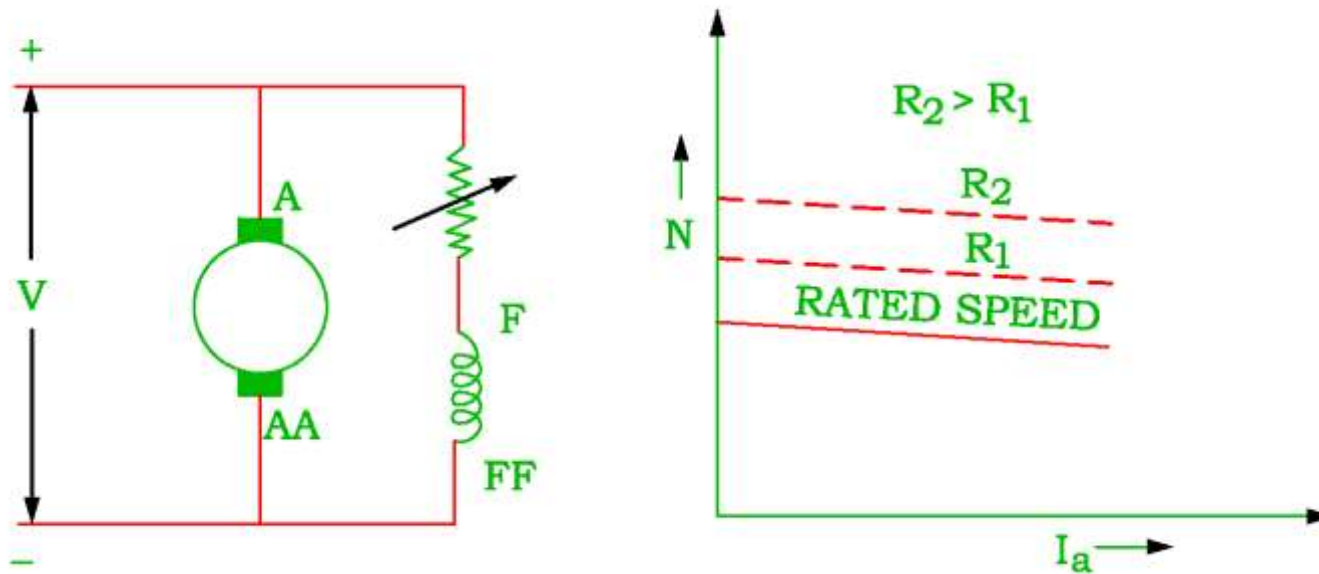
Disadvantages:

- Here input power is constant but output power $E_b I_a$, becomes less for lower speeds. So more power is wasted.
- Change in speed with change in load becomes large.



(ii) Field Control Method

- By varying flux, speed can be varied by adjusting the resistance which is connected in series with field.
- This method can be used for increasing the speed above its rated speed.





Advantages:

- Convenient and easy method
- Little power is wasted as heat
- Speed is independent of load

Disadvantages:

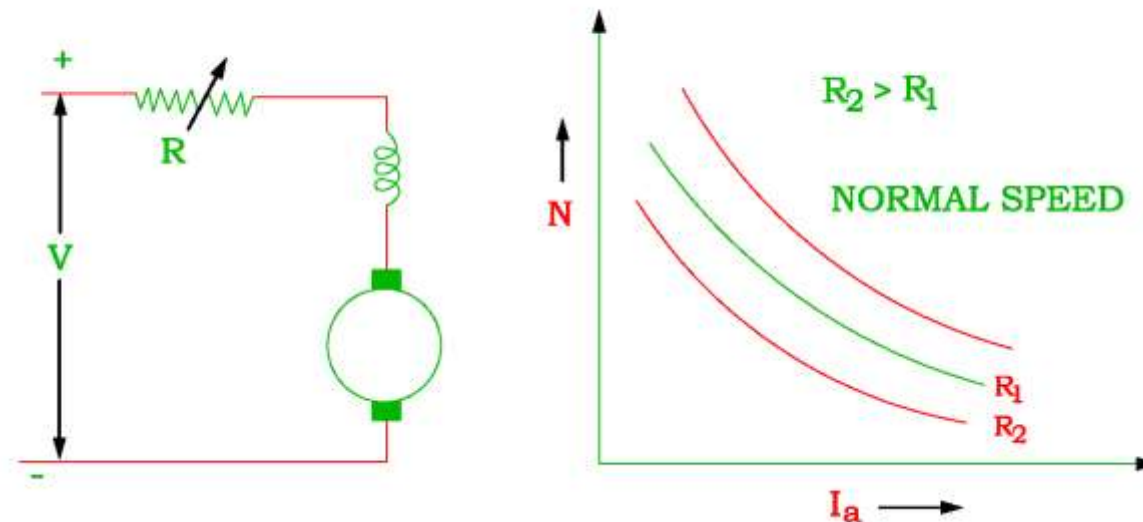
- Only higher speed can be obtained i.e above the rated speed.



SPEED CONTROL OF DC SERIES MOTOR

(i) Armature Control Method:

- By increasing the resistance, the applied voltage across the armature terminal can be decreased.
- If V_a is decreased then Speed also decreases. ($N \propto E_b$ or V)





(ii) Field (or) Flux Control Method

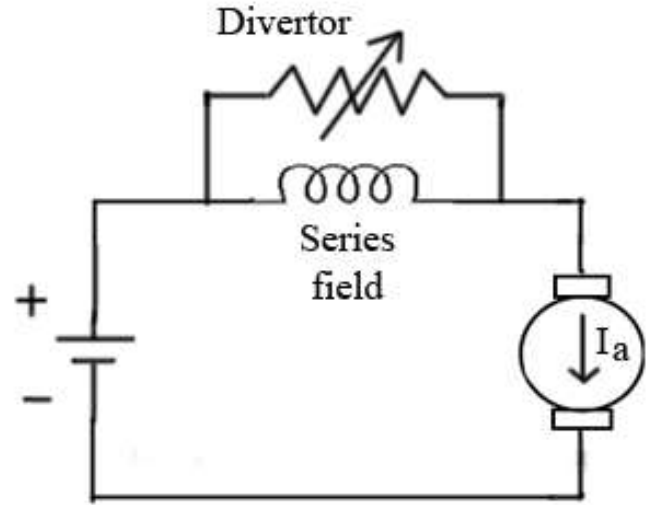


fig (a) Field Divertor

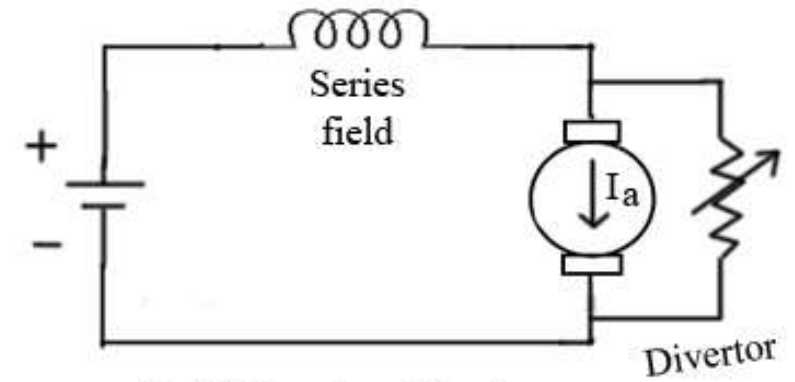


fig (b) Armature Divertor

www.electricaleasy.com

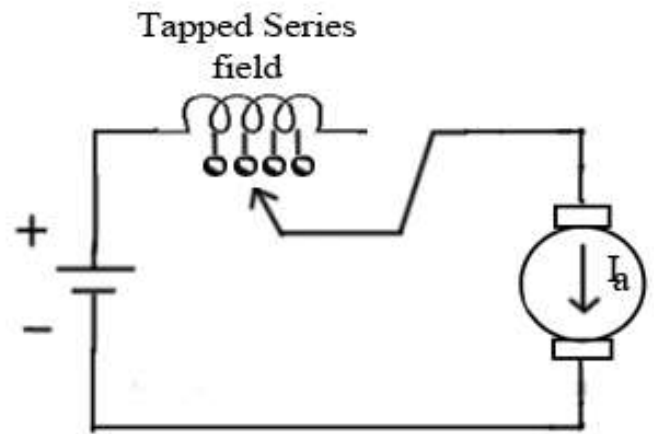


fig (c) Tapped field

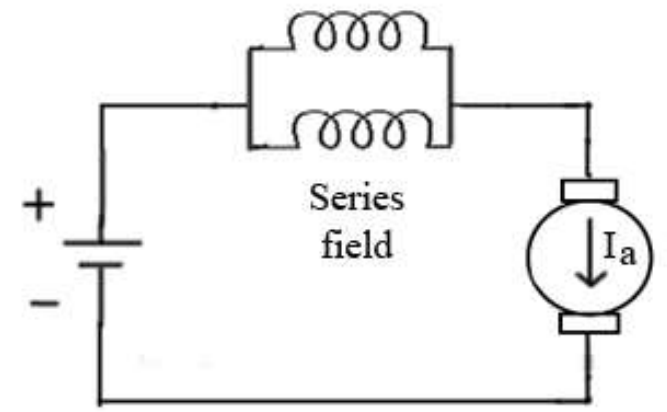


fig (d) Paralleling Field coils



REFERENCES

1. Murugesh Kumar K, “Electric Machines Vol I”, Vikas Publishing Pvt Ltd , (2010)
2. Gupta J.B,“ Theory and Performance of Electrical Machines”, S.K.Kataria and Sons, (2002)
3. Kothari D.P and Nagrath I.J“ Electric Machines”, Tata McGraw Hill Publishers, (2002)
4. Bhimbhra P.S., “Electrical Machinery”, Khanna Publishers, (2003)

THANK YOU