A Review On Different Methods For Excitation Of DC Generator

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Abstract

The excitation of a DC (Direct Current) generator is a critical aspect of its operation, as it directly influences the generator's performance and output characteristics. This abstract provides an overview of the methods employed to excite DC generators, highlighting the significance of excitation in maintaining a stable and controllable electrical output.

DC generators rely on a magnetic field to induce electromotive force (EMF) in their armature windings. To establish and control this magnetic field, various excitation methods are employed, including self-excitation, separate excitation, and compound excitation

Introduction

An electric generator or electric motor consists of a rotor spinning in a magnetic field. The magnetic field may be produced by permanent magnets or by field coils. In the case of a machine with field coils, a current must flow in the coils to generate the field, otherwise no power is transferred to or from the rotor. The process of generating a magnetic field by means of an electric current is called excitation. For a machine using field coils, which is most large generators, the field current must be supplied, otherwise the generator will be useless. Thus it is important to have a reliable supply. Although the output of a generator can be used once it starts up, it is also critical to be able to start the generators reliably. In any case, it is important to be able to control the field since this will maintain the system voltage.

Types of excitation

(1)separately excited generator.

(2)self-excited generator.

Self generator is classified into 3 types.

1. shunt generator.

2. series generator.

3.compound generator.

Compoud generator is again classified into 2 types.

1.short shunt generator.

2.long shunt generator.

Separately excited generators

These kind of generators has provided field exciter terminals which are external DC voltage source is supplies to produce separately magnetic field winding (shunt field) for magnetize of the generator as illustrated in figure as below

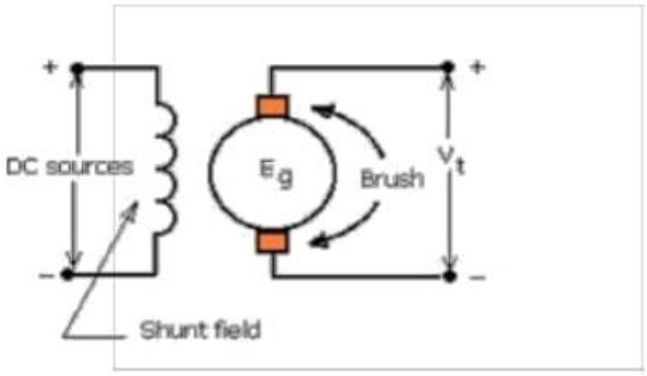

Fig 1.1 Separately Excited generator

Self excited field generators

This type of generator has produced a magnetic field by itself without DC sources from an external. The electromotive force that produced by generator at armature winding is supply to a field winding (shunt field) instead of DC source from outside of the generator. Therefore, field winding is necessary connected to the armature winding.

They may be further classified as

a) **Shunt geneator**.
This generator, shunt field winding and armature winding are connected in parallel through commutator and carbon brush as illustrated in the figure below.

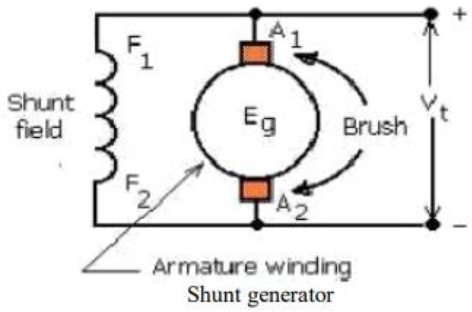

Fig 1.2 Self Excited field Shunt Generator

b) Series generator
The field winding and armature winding is connected in series. There is different from shunt motor due to field winding is directly connected to the electric applications (load). Therefore, field winding conductor must be sized enough to carry the load current consumption and the basic circuit as illustrated below

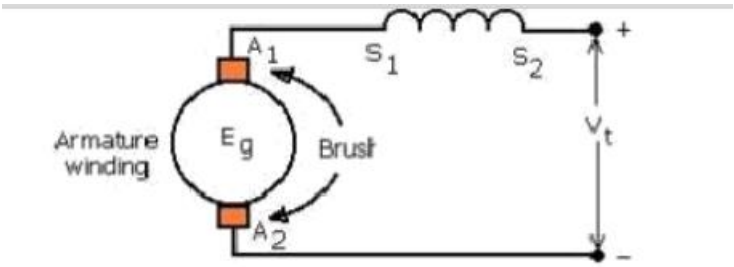

Fig 1.3 Series Generator

c) **Compound generator**

The compound generator has provided with magnetic field in combine with excitation of shunt and series field winding, the shunt field has many turns of fine wire and caries of a small current, while the series field winding provided with a few turns of heavy wire since it is in series with an armature winding and caries the load current. There are two kinds of compound generator as illustrated in figures below.

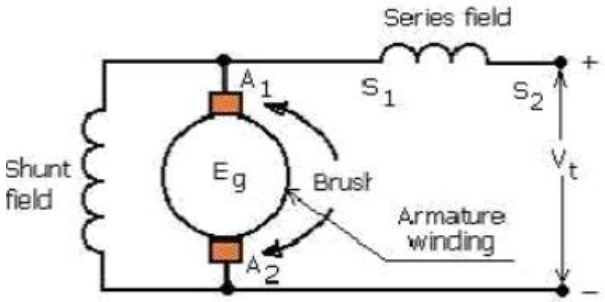

Fig 1.4 A short-shunt compound generator

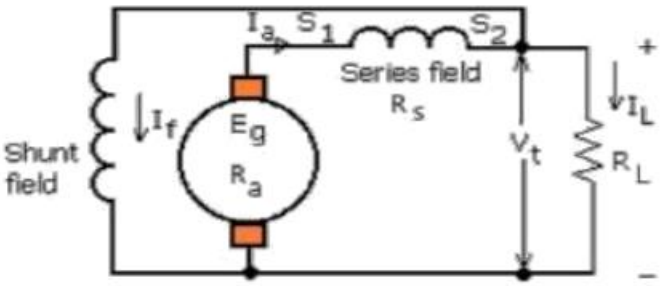

Fig 1.5 A Long-shunt compound generator

Conclusion :

In conclusion, excitation methods are integral to the functionality of DC generators, and understanding these techniques is essential for engineers and technicians working in the field of electrical power generation and distribution. The selection of the most suitable excitation method depends on the generator's intended application and the desired performance characteristics.

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