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Solar Connected Igbt Switch to Enhance Superconducting Magnetic Energy Storage System (Smes) for High Power Dc Application

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***Abstract*- A superconducting magnetic energy storage (SMES) system includes a high induction coil that can act as a constant source of direct current. A high temperature SMES (HTS) unit connected to an energy system can absorb and store active and reactive energy from this system and release these powers in this system during demand periods.**

***Keywords*- SMES, ANN, MOSFET, IGBT.**

I. INTRODUCTION

Superconducting magnetic energy storage devices can store excessive electronic energy as electromagnetic energy in high temperature superconducting inductors and release stored energy if necessary. MES is a large superconducting coil capable of storing electrical energy in the magnetic field generated by the current that passes through it. Actual power and reactive power can be absorbed or released from the MES coil according to the system power requirements.

The advantage of MES devices compared to other energy storage devices is the high energy storage density, high energy storage efficiency, long application life and low environmental pollution. Therefore, the main application of the superconducting magnetic energy storage system (SMES) is the load leveling of the power system, the power system stabilizers, the fault current limiter and the voltage support for critical loads due to the high efficiency of SMES and the rapid reaction to energy demand. To develop the inductor or superconducting magnet used in the MES system, the contribution of the superconductivity field is mainly contributed, while basic energy storage is provided from the storage devices.

Currently, the theoretical and observational studies of MES worldwide are mainly focused on the interactive influences between the magnetic storage system and the electric networks; however, at this point there is no independent theoretical study on MES.

An SMES device is a direct current device that stores energy in the magnetic domain. The current through the superconducting cable in a large magnet creates the magnetic domain. Since the energy is stored in the circulating current, the energy can be extracted from an SMES unit with almost instantaneous reaction to the energy stored or delivered during periods ranging from a fraction of a second to several hours.

An SMES unit consists of a large superconducting coil at cryogenic temperature. This temperature is sustained by a Dewar crystal that contains liquid helium or nitrogen vessels. A bypass switch is applied to reduce energy losses when travel is on hold. It also serves another 2 function such as passing the coil current if the power supply tie is lost, eliminating the service converter or protecting the coil if cooling is lost.

II. SMES OPERATIONAL ANALYSIS

The operation of SMES is based on the fact that the superconducting coil is charged with magnetic energy so that the current continues to flow in the superconductor even after the voltage across it has been removed. A superconducting coil that cools below its critical superconductive temperature has negligible resistance (zero). Therefore, the current will continue to flow in it.

The stored energy is inductive:

$$E = \tfrac{1}{2} LI^2$$

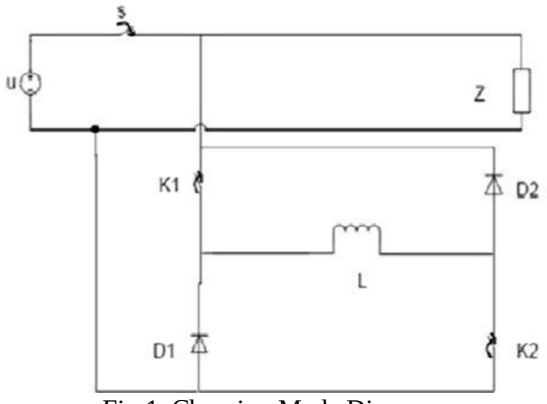

Fig 1. Charging Mode Diagram.

There are three different modes of SMES coil operations: -

- Charging mode
- Standby / freewheel mode
- Download mode

1. Charging Mode:
Charging mode shown in fig 1.

2. Standby / Freewheel Mode:

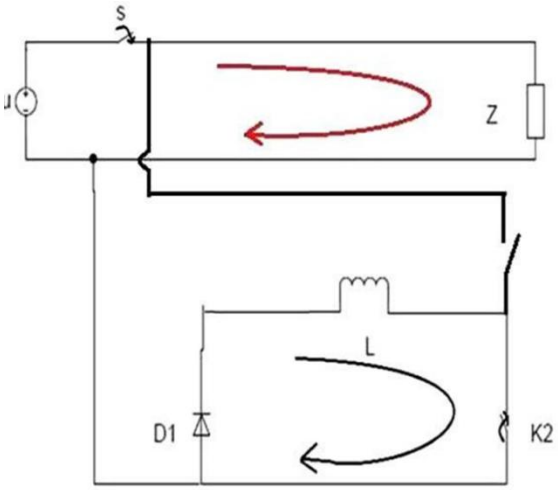

Fig 2. Standby / freewheel Mode Diagram.

III. DECLARATION OF THE PROBLEM

Based on the identified research gap, the following problem statement was made. "Superconducting magnetic energy storage unit to increase the stability of a solar power generation system"

IV. CONCLUSION

This paper provides a detailed review of the literature and the superconducting magnetic energy storage system. Increase the stability of a solar power generation system Cement Plastic bricks/Fly ash Plastic bricks reduces the usage of clay in making of bricks.

Cement Plastic bricks/Fly ash Plastic bricks give an alternative option of bricks to the customers on affordablerates.

Water absorption of Cement Plastic bricks is 0.95% and in Fly ash Plastic bricks is 0.06%.Compressive strength of Cement Plastic bricks is 28.57 N/mm2 at thecompressive load of 631.6 KN and of Fly ash Plastic bricks is 11.58 N/mm2 at the compressive load of 256.4KN.

We conclude that the Cement Plastic bricks/Fly ash Plastic bricks are useful for the construction industry when we compare with Fly Ash bricks and conventionalbricks.

Cement Plastic Bricks are having great strength and also minimum lower Water Absorption; hence this bricks can be used as Water Retaining Walls, Canal Pitching, and in Drainage Walls.

Fly Ash Plastic Bricks are can be used in general construction work, this bricks are having a great surface finish, because of this the cost of plastering can be reduced and a plane surfaceobtained.

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