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VOLTAGE DIP AND OVER VOLTAGE MITIGATION USING D-STATCOM IN NON CONVENTIONAL ENERGY BASED DISTRIBUTED GENERATION SYSTEMS

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ABSTRACT

Non conventional energy will be the alternative solution where the power will be needed, fluctuation will be more compared with the conventional energy. We give the more importance for balancing of the voltage. Compensating the voltage by using D-STATCOM, D-STATCOM will be placed at the point of common coupling to balance the voltage the voltage dip and over voltage will be compensating both the supply side and demand side. An energy storage battery will be placed at the DC side to improve the power quality. Sensitivity to voltage dip and over voltage varies within different application the proposed device quickly identifies the voltage dip and over voltage conditions and balancing the voltage by either boosting the input voltage during the voltage dip events or reducing the voltage during the over voltage events. Simulation results are presented for various conditions of voltage dip and over voltage disturbance in the supply voltage to show the compensation effectiveness.
Keywords: D-STATCOM, MATLAB, Power Quality

1. INTRODUCTION

Demand for the energy is increase because of limited supply of our main energy source together with the growing concern about global warming and climate changes. The development of non conventional energy sources such as wind energy, solar energy, tidal energy etc. to produce the power to fulfill the demand of the electricity. The main disadvantage of non conventional energy source will gives the low power convergent efficiency because of the fluctuating will causes the voltage dip and over voltage. The power quality refers to ability of electrical equipment to consume the energy being supplied to it a number of power quality issues including electrical harmonics poor power factor then voltage instability and imbalance impact on efficiency of electrical equipment. The quality of electrical power is an important contributing factor to the development of any country and this can be achieved through continuous power quality monitoring.

2. METHODOLOGY

2.1 BLOCK DIAGRAM

When the distributed power generation plants supply an voltage to load on that time first the voltage comes to PCC (point of common coupling) the sensitive loads and heavy loads and D-STATCOM all are connect to PCC then from that point the voltage will be divided to loads. And the sensitive loads nothing but hospitals, colleges and hotels etc. and heavy loads is nothing but industries on that time the voltages will be varying depending upon the loads when the voltage will be decreases from prescribed limit that condition will be called as voltage sag and increasing the voltage level from prescribed limit is called voltage swell. On that conditions the load side connected equipment may get damage so avoid these problems we connect the D-STATCOM compensator. This D-STATCOM compensator will absorbs the voltage when the voltage swell condition and that voltage will be stored in the form of DC in energy storage device connected at the end of D-STATCOM and that stored voltage will be come into use when voltage sag happens.

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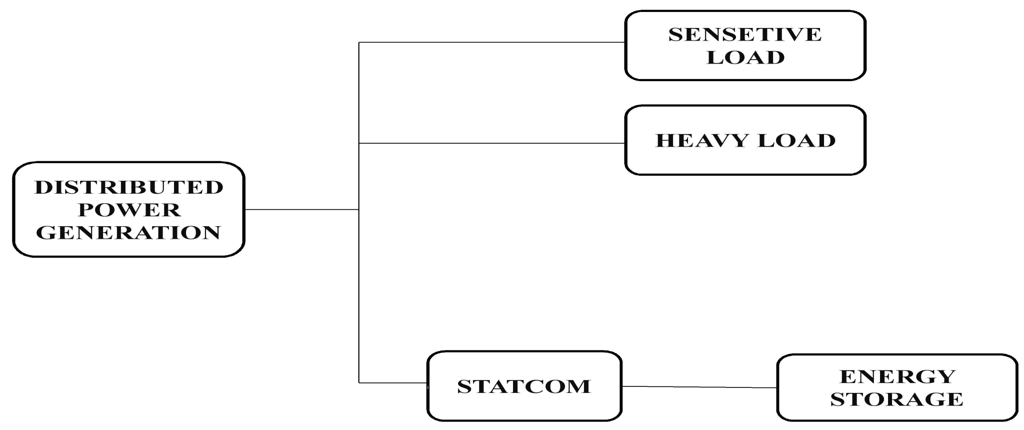

Fig. 1: Proposed power system

2.2 D- STATCOM CONFIGURATION

D-STATCOM can be used to improve the power quality. It's a power electronics device designed for low and medium grid voltage. In this work, the compensator consists of three phase three wires voltage source converter inserted in shunt with the grid and linked to a battery by its DC bus. The energy storage system allows it to control both of active and reactive power flow in the grid.

The D-STATCOM compensator generates a voltage in the same phase as the grid voltage, but not with the same magnitude. In fact, the compensation mechanism depends considers the grid as an inductive load then, it injects the reactive power, Otherwise (pcc higher than vco), the compensator absorbs the surplus of reactive power, the compensator operates until achieving an acceptable network operating condition where the D-STATCOM output voltage and grid voltages become on the same phase and have the same magnitude.

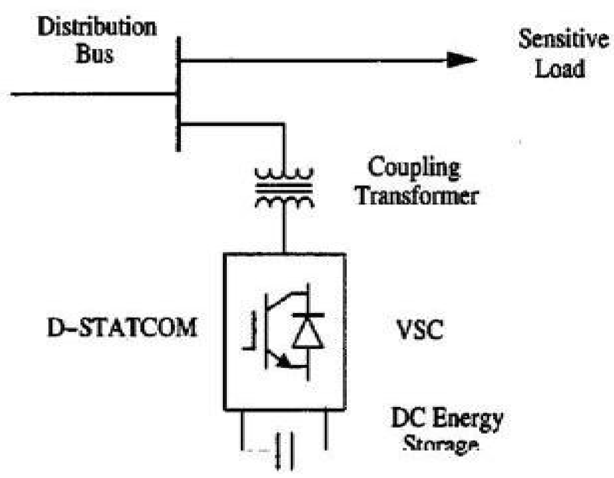

Fig2.D-statcom compensator

3. RESULT

The following waveforms will be the outcome result of the voltage sag and swell mitigation by using D-STATCOM compensator in MATLAB Simulation.

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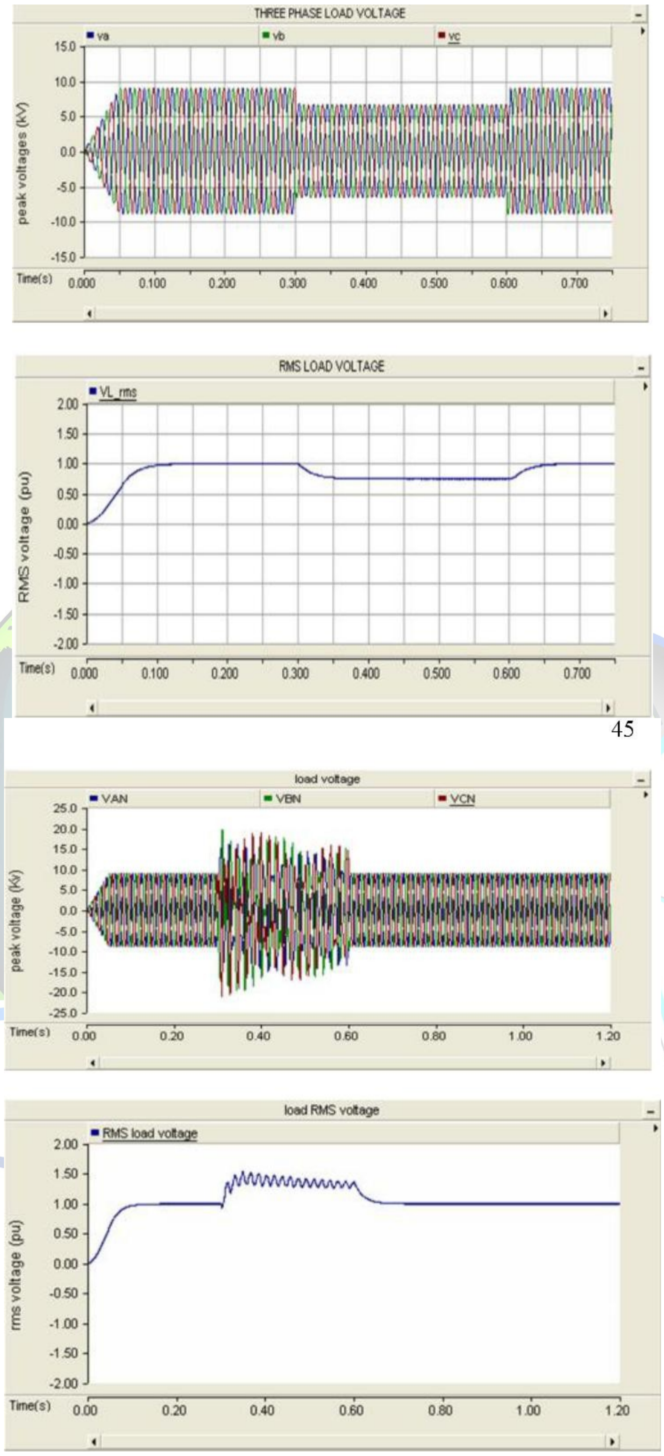

Fig. Voltage Sag and swell waveforms without DSTATCOM

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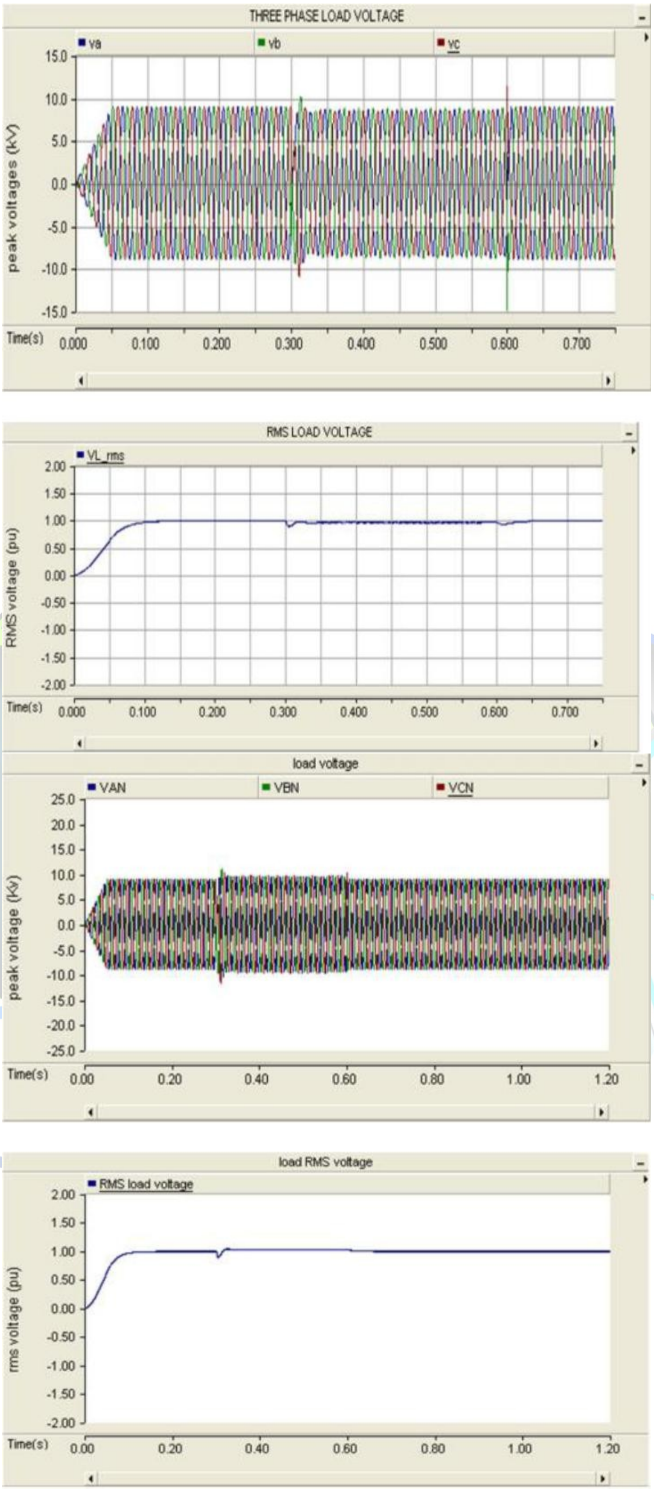

Fig. voltage sag and swell waveforms with DSTATCOM

4. CONCLUSION

Now a days the voltage sag and swell are the major issues so eliminating those disturbances and give constant voltage supply to loads can be done by using D-STATCOM compensator so this is the very much easiest and advantageous method to mitigate the voltage disturbance.

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