Reactive Power Compensation by an Eleven Level H Bridge Converter Based STATCOM

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ABSTRACT

The many-level voltage starting point changer based at rest occurring simultaneously compensator (STATCOM) is designed and implemented using MATLAB SIMULINK. By balancing the reactive power in the system, this workroom will repair the voltage. For reactive power regulation, a noise in back compensator (STATCOM) based on cascaded many-level changers (CMC) is utilized. A cascaded many-level changer is a three phase VSC that primarily consists of H-bridges coupled in number, order, group, and line. It has three single sides (of a question) among its elements. Each single phase H-bridge changer contains two arms made up of two GTOs and a diode connected in the opposite direction of each other. Each H-bridge includes a separate capacitor, which acts as serve as the origin of an electric force. Five individual capacitors with the same capacitance are chosen to match the monetary, material, and harmonic example requirements for judging. The idea put out in this work increases the worth of the power granted to property in the law while supporting the oneness of the power used for the owner. A discussion based on total harmonic distortion (THD) calculations has been held in comparison to harmonic measurements. For assessing the performance of the offered control design, MATLAB/SIMULINK is employed by a different party.

Keywords-ReactivePowerCompensation,STATCOM,Multi-levelconverterTopology

I.Introduction

A significant source of work-room in the control of electric energy systems is reactive power balancing activity. The method of finding from examples amount uses both action-bound power and additional reactive power (measured in KVAR) to carry out the required job. Findings from instances quantities (measured in KVAR) enhance the distribution system's clear power

(measured in KVA) to accommodate the required reactive power. This becomes crucial because ineffective utilization of electrical power during reactive power balancing causes energy to be wasted. Some urinary facts equipment's (Fixed capacitor, capacitive banks, and simultaneous apparatus for turning steam into water) were developed to address this low remuneration for loss.STATCOM with an eleven-level CHB multilevel inverter with a PI controller for the reduction of reactive power, voltage flicker, and current harmonics in nonlinear load.

2. Reactivepowercompensation

The STATCOM is a specialized power device with a voltage or current source inverter that is shunt linked to the power system. It is connected to the distribution systems close to the load. Figure.1 shows the basic components of STATCOM. A control unit that generates PWM signals for the inverters switches makes up STATCOM together with an inverter, a coupling inductance, a dc link capacitance, and an inductance. In Figure 4, Rdc and R stand for the coupling inductance's winding resistance and switching losses in the inverter, respectively.By controlling the amplitude of the inverter output voltage VI, reactive power exchange between the distribution system and STATCOM is made possible.

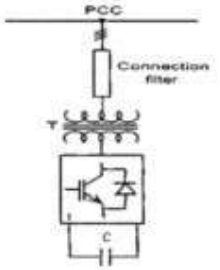

Fig.1ConfigurationofaSTATCOM

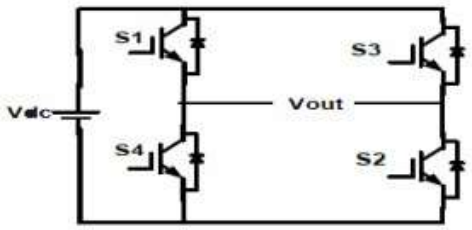

Fig.4CircuitDiagramoftheSingleCascadedH-Bridgeconverter

As a result, the Modulating Index can be used to adjust the STATCOM output voltage (MI). As long as each individual inverter is in the linear modulating zone, STATCOM is proportional to

MI. The suggested STATCOM provides an extremely quick dynamic reaction to system reactive power demand since it can modulate the output voltage.

3. SimulationResults

All work has done by using MATLAB/SIMULINK &Sim Power systems. As shown in the figure 3 there is noSTATCOM in SIMULINK circuit diagram. Figure 4 represents the SIMULINK diagram for STATCOM Basedon Eleven Level H-Bridge Converter. Figure 5 denotes the eleven level output voltage waveform & figure 6represents the output voltage THD of 4.40%. Figures 7 & 8 represent the load three phase voltage & currentwithout STATCOM&withSTATCOM.

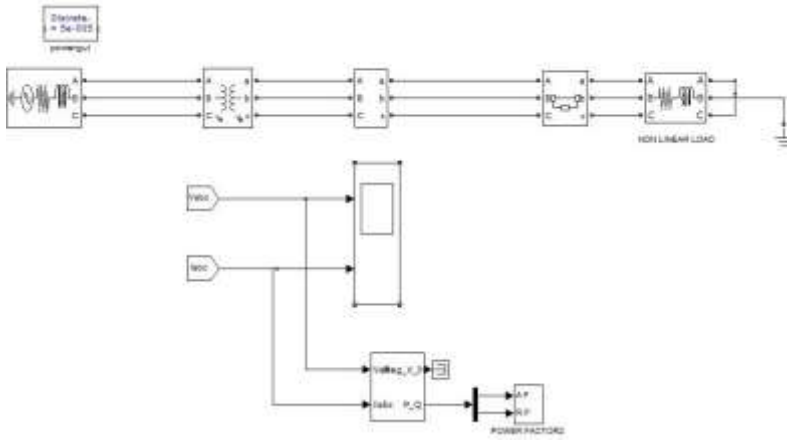

Fig.3ProposedSIMULINKcircuitwithoutSTATCOM

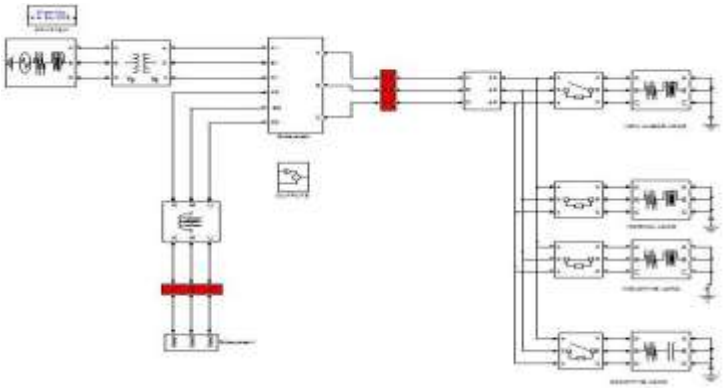

Fig.4ProposedSIMULINKcircuitwithSTATCOMsimulationresults

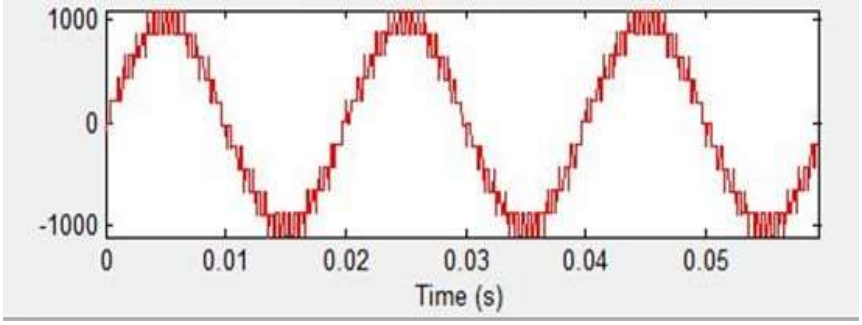

Fig.5Elevenleveloutputvoltage

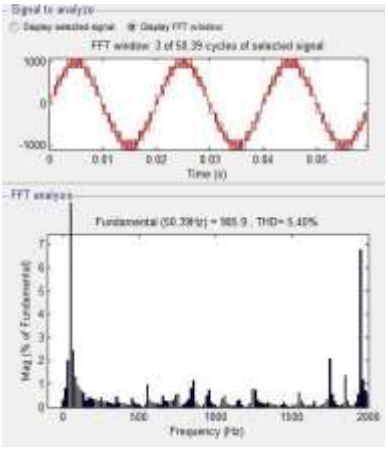

Fig.6THDofoutputvoltage

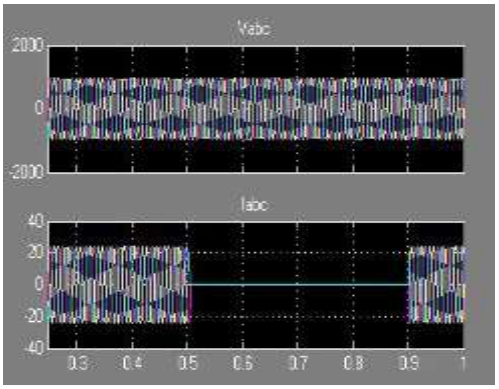

Fig.7Threephasevoltage&currentwithoutSTATCOM

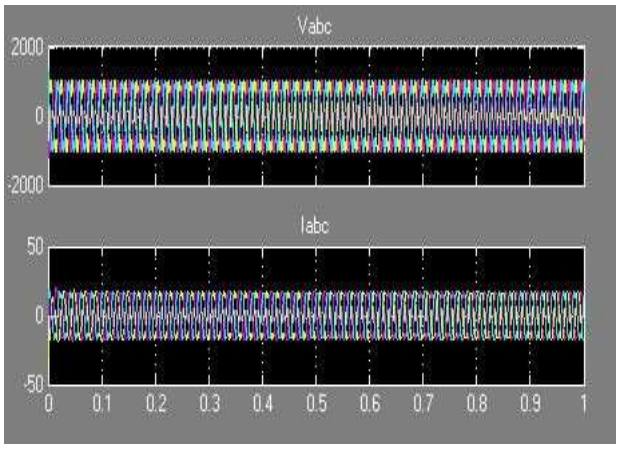

Fig.8Threephasevoltage&currentwithSTATCOM

4. Conclusion

This project provides a reactive power adjustment solution for generating stations, industries, and transmission lines. The cascaded controller is intended for ST A TCOM with eleven levels and a CMC. These control strategies keep the rated supply voltage for any load variation within the rated value and manage the capacitor voltage of the STATCOM. It has been demonstrated that the CMC can successfully lower the THD values of output voltage and current. The CMC-based STATCOM makes sure to balance out reactive power and minimize harmonics in STATCOM output.

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