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REVIEW OF STATCOM IN GUIDING THE GRID CONNECTED WIND ENERGY FOR POWER QUALITY ENHANCEMENT

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ABSTRACT
There is a problem with the different quality of electricity due to the use of renewable energy, one of which is the power of the wind. Infusion of a wind farm into the grid affects the quality of electricity. According to the guidelines established by the International Electro technical Commission, IEC - 61400 standards, the performance, and electricity quality of the wind turbine are determined based on the measured values and follows the rules. The result of the wind turbine on the grid system of the power quality measurement is the electrical behavior of active power, reactive power, voltage change, and flicker, harmonic and switching operation, guidelines measured according to domestic/international. Paper investigations highlight the problem of electric quality in the installation of wind turbines on the grid cause grid. In this proposed design, the static compensator (STATCOM) is connected to the common connection point of common couplingwith a battery energy storage system (BESS) which alleviates the problem of electric quality. The battery case is integrated to maintain the actual source of variable leeward energy. In order to improve the quality of the electricity, the STATCOM control plan of the wind-powered system connected to the network. The effectiveness of the proposed method reduces the reactive power demands of the load and the main power supply of the induction generator. It is planned to present development of network coordination rules and to improve power quality specifications by IEC network.

INDEX WORDS: Wind Energy, STATCOM, Reactive Power Compensation, Power Quality Improvement.

INTRODUCTION

A gap of demand for energy and energy production has grown day by day. Thus, the energy requirement of which is provided by renewable energy sources. Renewable energy is one of the major sources to meet energy demand. This renewable energy, mainly through the use of solar and wind energy. Production and transmission is a complex process in order to maximize performance must work in conjunction with many of the power system components. One of the major components that make up the bulk is reactive power in the system. There is a need to maintain the trend towards supplying active power over the line. The load, such as an engine load and other loads, requires reactive power for its operation. To improve the performance of the AC power supply system, it should handle this reactive power effectively. This is called offset reactive power. The problem of reactive power compensation, there are two features to the load compensation and the supporting voltage. Load compensation, improved power factor, real power balance derived from the power supply and consists of a high voltage setting from a large fluctuation of the load. Support voltage consists of decreasing voltage fluctuations in a given terminal of the transmission line. You can use two types of offset hedge compensation and branch compensation. These are to change the system's parameters in order to strengthen the VAR compensation. Recently, Static VAR Compensators, such as a STATCOM have been developed.

One of many devices under family FACTS is a setting device that can be used to adjust the flow of reactive power to the system of other system parameters regardless of STATCOM. STATCOM can not exchange active power with the AC system unless it supports long-term energy to the network side. In the transmission system, STATCOM mainly provides the voltage support of the bus via modulation of the bus voltage during the dynamic disturbance, in order to handle the active power of the basic exchange and to provide better transient characteristics, Improved temporary stability margin Removed system vibration due to these diseases.

The STATCOM, SCR, (three-phase PWM converter) using the MOSFET or IGBT, DC capacitor provides a DC voltage to the inverter, a link reactor to an AC power inverter output and the removal of high-frequency components from cause of PWM converter. On the DC side of the capacitor, three phase voltage is generated by an inverter. This is synchronized with the AC supply. Connector coil Connects to the voltage on the supply side of AC power. This is the basic principle of operation of STATCOM. They have the same frequency if the AC power supply to AC connected via a series inductor, active power flows from the larger source to delay the source, the reactive power of the higher voltage of the low voltage than the magnitude of its source flows to the source. The difference in the phase angle between the power supplies will determine the active power flow; the difference in the magnitude of the voltage between the power supplies determines the reactive power flow. Thus, by varying the magnitude of the VSC voltage relative to the source bus voltage, you can use the STATCOM to set the reactive power flow.

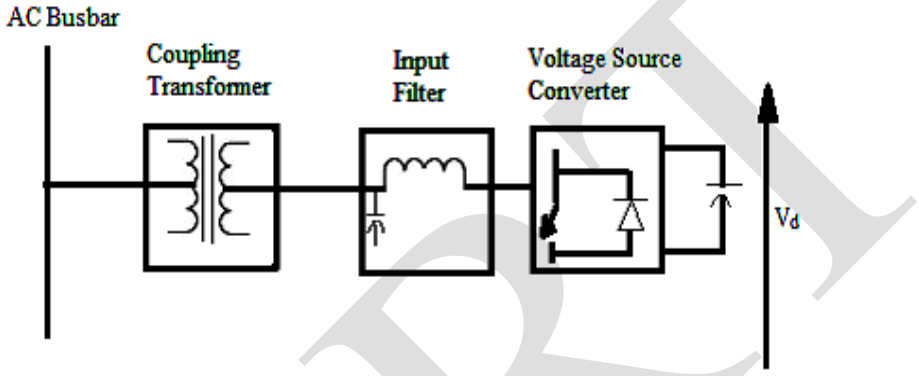

Fig.1 Static Synchronous Compensator

LITERATURE REVIEW

Gaurav Tembhurnikar, Ajit Chaudhari, Nilesh Wani, Atul Gajare, Pankaj Gajare [1],presented various reactive power compensation techniques required by any network of power systems using FACTS equipment. This is a better solution to any problems related to delays in either FACTS equipment or power transmission in today's world to realize the lead system of the power system network. In this article, we will study the shunt FACTS controller function of STATCOM and it will help to make effective use of the network how it will operate under normal conditions. Firstly, it must be considered that with the control of reactive power, we will analyze literature review of several documents related to FACTS and STATCOM data.

Ahmed Abu Hussein and Mohd. Hasan Ali [2], was connected in series by such inductive inductor speed superconducting (superconducting fault current limiter), dynamic voltage as reset (DVR), battery thyristor (TCSC) and Series Dynamic Braking Resistor (SDBR). We presented a comparison with auxiliary equipment, which can improve the harmonic,fault ride through capability improvement, the complexity of the controller and the possibility of suppressing the speed of the constant speed wind turbine system. Superconducting fault current limiters, however, are most efficient at reducing active power fluctuations and wind flow stator and are the most expensive among all devices. SDBR is inexpensive and shows better improvement by reducing active power and limiting fault current compared to DVR and TCSC.

Shervin Samimian Tehrani1, Peyman Salmanpour Bandaghiri [3], presented a simulation of the system 14 buses using STATCOM, which is compensated by the error application; we see the effect of the voltage compensation bus. System voltage stability is affected by reactive power limits of the system. FACT device improves the reactive power flow in the system, thereby improving the stability of the voltage. This document describes the effects of STATCOM on static stress stability. 14 bus system has been used to demonstrate its ability STATCOM is to improve the voltage stability margin in IEEE. These FACT controllers help increase the load capacity margin of the power grid.

P. Venkata Kishore, Prof. S. Rama Reddy [4], presented D - STATCOM, a distributor that connects FACTS devices that provide a reaction force to the load to improve the stability of the load bus voltage. The D - STATCOM multichannel system can reduce loss and improve voltage regulation. We handle this paper in D-STATCOM comparison based on push-pull tension inverter for the multi-channel system. Eight channel

systems are formed using SIMULINK data. The model has been developed for the eight bus systems without D - STATCOM. The two D - STATCOM systems are compared against total harmonic distortion and reactive power. They examined relative to improve voltage stability by D - STATCOM at load busses.

RESEARCH WORK

Base on STATCOM, voltage source inverter presents the current into the grid in such a way that the current of the source is restricted harmonics and the phase angle with respect to the voltage of the source has the preferred value. The current is injected; the reactive part and the harmonic part of the load current and the induction generator are canceled, which advances the power factor and power quality. To achieve these objectives, the voltages detected and synchronized to produce the start command for the inverter. The proposed grid connected system is applied to improve the quality of power at the common coupling point (PCC), as shown in Fig.1 connected to the grid system of Figure 1 comprises a wind power generation system, And battery storage system with STATCOM.

A. WIND ENERGY GENERATING SYSTEM

In this system, generations of wind topologies are based on constant turbine pitch control speed. The induction generator is used in its proposed simplicity due to its system, it does not require a separate field circuit to accept fixed and variable loads, and it is naturally short-circuited proof.

B. BESS-STATCOM

The battery energy storage system (BESS) is used as an energy storage element for voltage regulation. The BESS will naturally keep the constant DC condenser voltage constant and it will be better to adapt STATCOM, as quickly inject or consume reactive power to stabilize the grid system. It also controls the distribution and transmission system at a very fast rate. When there is a variation in the power system, the BESS can be used to adjust the power fluctuations with the load and discharge process. The battery is connected in parallel with the DC capacitor of the STATCOM.

The STATCOM is a three-phase voltage source inverter that has the capacity for the DC connector and is connected to the common coupling point. The STATCOM injects a compensation current with a variable size and frequency component into the common coupling point.

C. SYSTEM OPERATIONAL SCHEME IN GRID SYSTEM:

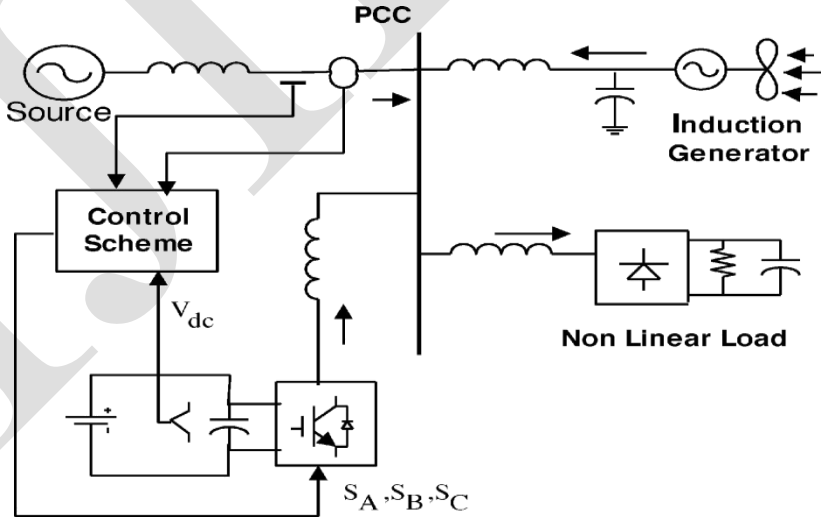

Fig.2. System operational scheme in grid system

The current control strategy is encompassed in the control system which expresses the operation of the STATCOM compensator in the power system. It is proposed that a single STATCOM using an insulated gate of bipolar transistors having a reactive power support, induction generator and non-linear load on the network system. The block top diagram of the scheme of the system shown in Fig.2

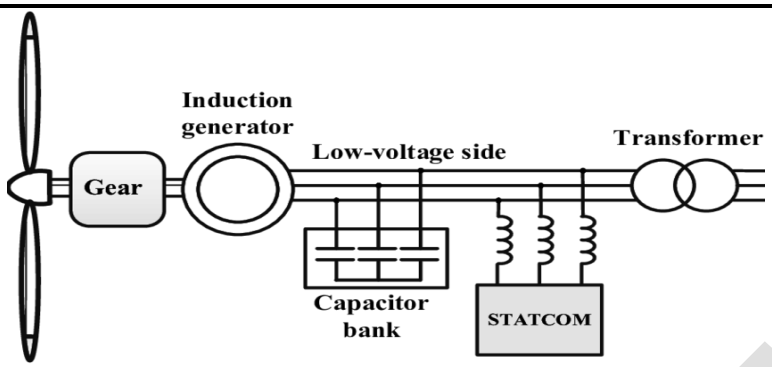

Fig.3 Basic Block Diagram of Proposed System

Here, Central SDBR and STATCOM to be associated with the terminal of a wind farm to connect the power system to observe the efficiency of the proposed system during normal network error conditions. Figure 3 shows a basic diagram of the proposed system components. It consists of wind power generation system, SDBR, STATCOM and a controller to control the STATCOM and SDBR actions. A dynamic braking resistor set (SDBR) contributes directly to the ratio of active forces during the failure and STATCOM helps to regulate the reactive power flow.

CONCLUSION

In this way, the article presents the STATCOM-based control scheme to improve the quality of electricity in the wind turbine generation system and non-linear load. It examines the problems of electricity quality and its impact on consumers and the electricity company. It has the ability to cancel harmonic parts of the load current. The source voltage and current in phase are conserved and maintains its reactive power demand for the turbine and the load on the PCC in the network system, thereby providing the opportunity to improve the utilization rate of the line transmission. The scheme proposed in the network associated with the network complies with the power quality standard.

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