A Review on Designing of 100KV Grid Power using Hybrid Parameters

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Abstract: Now a day's electricity is most needed facility for the human being. All the conventional energy resources are depleting day by day. So we have to shift from conventional to non-conventional energy resources. In this the combination of two energy resources is takes place i.e. wind and solar energy. This process reviles the sustainable energy resources without damaging the nature. We can give uninterrupted power by using hybrid energy system. Basically this system involves the integration of two energy system that will give continuous power. This electrical power can utilize for various purpose. Generation of electricity will be takes place at affordable cost. This paper deals with the generation of electricity by using two sources combine which leads to generate electricity with affordable cost without damaging the nature balance.Environmentally friendly solutions are becoming more prominent than ever as a result of concern regarding the state of our deteriorating planet. This project presents a new system configuration of the front-end converter stage for a hybrid wind/photovoltaic energy system. The Aim of this project is to implement the converter and inverter for the wind and solar hybrid system. For the hybrid system, extracting energy from wind and solar as possible and feeding the load with high quality electricity are the two main targets. Boosting the DC voltage to enough level using the converter and obtaining pure AC voltage from the inverter are the keys to realize the above targets. This configuration allows the two sources to supply the load separately or simultaneously depending on the availability of the energy sources.

Keywords: Hybrid energy, Grid power, Converter, Renewable energy

Literature Survey:

Chih-Chiang Hua et al. (2008) This paper presents a bi-directional dc/dc converter used in a hybrid wind generator(WG)/lead-acid battery power system with state machine control. State machine control strategy is used to control the system power flow and load sharing and it can also raise the system power capacity. The battery is charged or discharged through the bidirectional dc/dc converter. By adjusting the duty cycle of the power converter, multi-stage current charging control of batteries is realized and the efficiency of charging is improved. The proposed control method can be easily extended to other renewable energy conversion systems.

A. Ramesh et al. (2013) This paper presents the control of a multilevel inverter supplied by a Photovoltaic (PV) panel, wind and a batteries bank. It is well known that the power quality of multilevel inverter signals depends on their number of levels. However, the question that arises is whether there is a limit beyond which it is not necessary to increase the number of level. This question is addressed in this paper by studying seven-level and nine - level diode clamped converters. The harmonics content of the output signals are analyzed. Comparison between the seven level and nine level diode clamped converter is shown. A simplified Pulse Width Modulation (SPWM) method for a multilevel inverter is developed. The controller equations are such that the SPWM pulses are generated automatically for any number of levels. The effectiveness of the propose method is evaluated in simulation. Matlab Simulink is used to implement the control algorithm and simulate the system.

B. MAHESH et al. (2014) The proposed system presents power-control strategies of a grid-connected hybrid generation system with versatile power transfer. This hybrid system allows maximum utilization of freely

available renewable energy sources like wind, fuel and photovoltaic energies. For this, an adaptive MPPT algorithm along with standard perturbs and observes method will be used for the system. The objective of this paper is to study a novel Multi level multistring inverter topology for DERs based DC/AC conversion system. In this study, a high step-up converter is introduced as a front-end stage to improve the conversion efficiency of conventional boost converters and to stabilize the output DC voltage of various DERs such as PV, Wind and fuel cell modules for use with the simplified newly constructed multilevel inverter. The proposed multilevel inverter requires only six active switches instead of the eight required in the conventional cascaded H- bridge (CCHB) multilevel inverter, control with SVM technique. The inverter converts the DC output from nonconventional energy into useful AC power for the connected load. This hybrid system operates under normal conditions which include conventional and proposed cases of solar energy, fuel and wind energy. The proposed simulation results are presented to illustrate the operating principle, feasibility and reliability of this proposed system for Renewable resources.

P. Ganesh et al. (2014) With the increasing concern of global warming and depletion of conventional resources we have to look at sustainable energy solutions like renewable energy sources. This paper proposes a renewable hybrid wind solar energy system fed single phase multilevel inverter. The hybrid system is the combination of photo voltaic (PV) array and wind generator. Solar energy is generated by using PV arrays, wind power is generated by using wind generator and both the generated voltages are boosted up by boost converters. These boosted voltages are fed to the single phase multi level inverter. Due to the intermittent nature of both the wind and solar energy sources, a fuel cell can be used as an uninterruptable power source, which is able to feed a certain amount of power to the load under all conditions. Simulation models are constructed for the both single phase inverter, single phase multilevel inverter and it is validated through experimental results using PIC micro controller.

Karim Mousa et al. (2014) Although solar and wind energy are two of the most viable renewable energy sources, little research has been done on operating both energy sources alongside one another in order to take advantage of their complementary characters. In this paper, we develop an optimal design for a hybrid solar-wind energy plant, where the variables that are optimized over include the number of photovoltaic modules, the wind turbine height, the number of wind turbines, and the turbine rotor diameter, and the goal is to minimize costs. Simulation studies and sensitivity analysis reveal that the hybrid plant is able to exploit the complementary nature of the two energy sources, and deliver energy reliably throughout the year.

Y.M.Y Buswig et al. (2014) A renewable energy source that works alone can't achieve customers' requirements for a stable power supply. Therefore, the paper proposes a multi-input converter for hybrid renewable energy system. This converter is designed for two input sources, PV and wind generator in order to design high efficiency and high performance converters for renewable energy applications. The proposed multi-input converter is composed by interleaved technique with two step-up converters and the two inputs are accommodated with some extra semiconductors, inductances and diodes. The modes of operation based on the status of the four switches, where S1 and S2 operate as main switches in order to deliver energy from both voltage sources. A constant output power to the load is provided by switching S3 switch, which guarantied the appropriate output voltage by reduce the ripple and improve the reliability. Simulations of multi- input converter has been performed using MATLAB/SIMULINK. The simulation results confirm the validity of the proposed method, which can be seen as a promising new topology that ensure multi-input converter suitable for renewable energy applications.

Kaliamoorthy et al. (2015) This paper presents a novel single phase cascaded multilevel inverter for renewable energy applications. The proposed inverter consists of two H Bridge inverter connected in cascade. The top H

Bridge inverter is a conventional H bridge inverter and is capable of developing three level output whereas the bottom H bridge inverter is a novel inverter which is capable of developing multilevel output. The proposed inverter is driven from a novel hybrid modulation technique, which eliminates the problem of capacitor voltage balancing issues. The proposed novel hybrid modulation technique switches the top inverter switches at high frequency and the bottom inverter switches at low frequency. The proposed inverter can be fed from any renewable energy source. In this paper, the top inverter is fed from PV arrays where as the bottom inverter is fed from wind turbine. The proposed inverter has many advantages such as; it has minimum number of power electronic devices, minimum conduction and switching losses, improved efficiency and minimum voltage stress on the devices. The proposed inverter fed from renewable energy sources is simulated in MATLAB/SIMULINK environment. To validate the simulation results a laboratory prototype is also built. The entire hardware setup is controlled by using FPGASPATRAN 3A DSP board.

Mohd Azman Rosli et al. (2016) The objective of this paper is to design a multi-input dc-ac inverter integrated photovoltaic array, wind turbine and fuel cell in order to simplify the hybrid power system and reduce the cost. The output power characteristics of the photovoltaic array, wind turbine and fuel cell are introduced. The operational principle and technical details of the proposed multi-input dc-ac inverter is then explained. The proposed inverter consists of a three input fly back dc-dc converter and a single phase full bridge dc-ac inverter. The control strategy for the proposed inverter to distribute the power reasonably to the sources and it achieved a priority of the new energy utilization is discussed. This multi-input dc-ac inverter is capable of being operated in five conditions and power delivered to the ac load can be either individually or simultaneously. First to third condition occurs when the power delivered from either renewable energy sources individually, fourth condition happens when power is demanded from two sources simultaneously, and finally when power are available from three sources simultaneously. The proposed inverter has been simulated by employing NI Multi sim 12.0 circuit simulator.

Mr. M. Nagaiah et al. (2017) In this paper, a control strategy for the power flow from a pv, battery and wind hybrid system coupled with a multilevel inverter for a domestic load application is presented. The proposed system aims to control the power flow from different sources to charge battery, supply the load demand and inject surplus power into the grid. The power from the pv and battery unit is harnessed using a buck boost converter and the power from wind is harnessed using a transformer coupled boost half bridge converter. The ac loads and power grid are connected through a single phase full bridge converter. The proposed converter architecture improves voltage gain, reduces the total harmonic distortion at the inverter level reducing the dependency on filters. This improvement in voltage gain helps to improve efficiency, lower the rating of circuitry components which in turn reduces the overall cost of the equipment used in the system. Simulation results show the improvement of the proposed system in various modes of operation.

S. Pardha Saradhi et al. (2017) In this project, a control strategy for power flow management of a grid-connected hybrid PV-wind-battery based system with an efficient multi-input transformer coupled bidirectional dc-dc converter is presented. The aim of our project is to satisfy the load demand, manage the power flow from different sources, inject surplus power into the grid and charge the battery from grid as and when required. A transformer coupled boost half-bridge converter is used to harness power from wind, while bidirectional buck-boost converter is used to harness power from PV along with battery charging/discharging control. A single-phase full-bridge bidirectional converter is used for feeding ac loads and interaction with grid. The proposed converter architecture has reduced number of power conversion stages with less component count, and reduced losses compared to existing grid-connected hybrid systems. Then we are going to test the single phase multilevel converter to feed ac loads and interaction with grid.

Proposed Methodology:

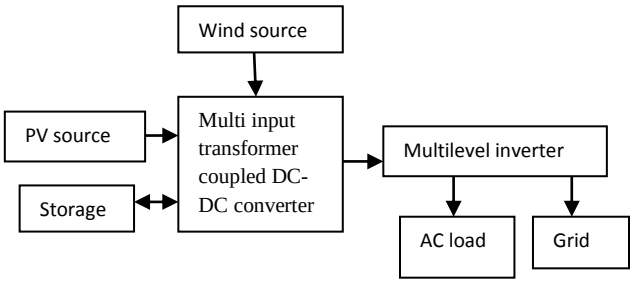

Figure 1: Block diagram of multilevel inverter connected hybrid system

The block diagram shown in Fig.3 shows the arrangement for a pv, battery and wind hybrid system. The photo voltaic system is connected in series with the battery so that power from pv is used to charge the battery and supply the load. Energy from wind is harnessed using a wind turbine which is connected to a generator to supply alternating current. In the absence of power from the pv, the power is supplied from the battery to the domestic load. A multi input transformer sums up the power generated from these sources and the power is further stepped up using a multilevel inverter where the voltage is boosted. The power output is connected to the domestic load and the surplus power is injected into the grid. With the use of multilevel inverter higher power and voltage is attained. Various level multilevel inverter are used and their simulations are presented to determine their advantages.

Conclusion: Hybrid power generation system is good and effective solution for power generation than conventional energy resources. It has greater efficiency. It can provide to remote places where government is unable to reach. So that the power can be utilize where it generated so that it will reduce the transmission losses and cost. Cost reduction can be done by increasing the production of the equipment. People should motivate to use the non-conventional energy resources. It is highly safe for the environments it doesn't produce any emission and harmful waste product like conventional energy resources. It is cost effective solution for generation. It only need initial investment. It has also long life span. Overall it is good, reliable and affordable solution for electricity generation.Developing hybrid systems is one of the most convenient and effective solution for producing electricity as compared to non-renewable energy resources. It is not only less costly but also it does not cause any harm to the environment. Another thing is that it can be used to generate electricity in hilly areas, where it is quite difficult to transmit electricity by conventional methods.

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