

ELEVEN LEVEL INVERTER FED DVR FOR INTEGRATION OF DISTRIBUTED ENERGY SYSTEM WITH GRID

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ABSTRACT

In this paper the main objective is to implement proper integration of grid with the distribution system. The topologies involves the modular inverter and the proper PWM technique will be combined in order to get pure sinusoidal wave form .This system makes use of the active power flow takes place properly to grid. There are many types of inverter and converters available .In this system we make use of the a rectifier to boost the output from renewable source. The boosted voltage has no possibility to merge directly by inverter. Thus the issues of harmonic distortion and ripples are fully incorporated in the system. So we make use of the flexible AC system that can adapt the needs of grid with proper control strategy.Thus a eleven level inverter is fed with the DVR so as to provide flexibility. In addition to that of that source side also should be controlled by the MPPT combined with the efficient control on source.

Keywords:, Multilevel inverter (MLI), Wind energy inverter (WEI),Dynamic voltage restorer(DVR).

1.INTRODUCTION

The power innovation is going for the significant commitment of making topology more one of a kind The utilization of the modern hardware/loads at transmission and dissemination level has expanded impressively lately because of the advancement in the semiconductor gadget innovation. The gear needs clean power with a specific end goal to work appropriately. In the meantime, the exchanging activity of these gadgets produces current music bringing about a dirtied dispersion framework. The power-gadgets based gadgets have been utilized to conquer the real power quality issues.

All the non-straight loads draw very mutilated streams from the utility framework, with their third sounds part nearly as huge as the key. The expanding utilization of non-direct loads, joined by an expansion in related issues concerns both electrical utilities and utility client alike. The power quality is enhanced by the utilization of usage of DVR.DVR is one of the significant custom power gadgets, equipped for alleviating the impact of energy quality issue. In existing framework DSTATCOM is utilized. DSTATCOM can repay all power quality issues-[17].

Dynamic Voltage Restorer gives high impedance way. In proposed framework

dynamic voltage restorer with thirteen level inverter along these lines they give the best yield to grid. The DVR, hence, is required to be a standout amongst the most capable answers for huge limit loads delicate to supply voltage glimmer.

2.EXISTING SYSTEM

The existing system has nine level inverter which has the capacity to reduce the harmonics at certain level only. But we replace it with eleven level so that we can able to reduce harmonics. Also that the need to have the flexible AC is provided by FACTS devices such that the DSTATCOM is used in the existing system. The DVR has the ability to control not only active reactive power flow in such away to improve the power delivered. Reactive power is regulated and transferred under any one of this method. The block diagram is shown in fig.1.

- Voltage control
- Current control
- Phase angle control

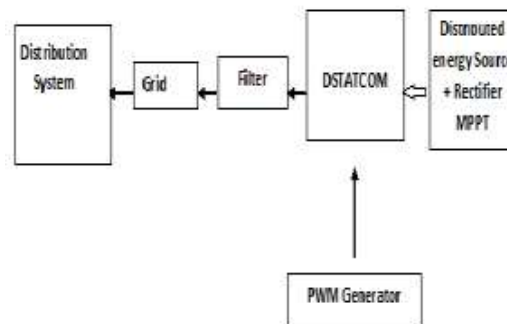


Fig.1 Block diagram of existing system

Disadvantages of existing system

- Output current and voltage having significant fluctuation.
- External devices needed for its operation.
- Does not provide good solutions for end users subjected to unwanted PQ disturbances

3.PROPOSED SYSTEM

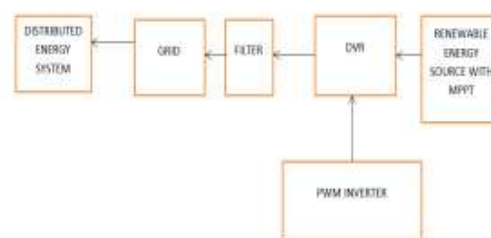


Fig.2 Block Diagram Representation of the Proposed System

The working of block diagram is shown in fig 2. generally deal with the purpose of acting the renewable energy source which actually from solar or wind etc. It is made to connect with the intelligent MPPT tracker that supports all possible way of completely exploiting the renewable energy source. Thus there is a possibility of maximum usage of natural energy-[5]. Thus the energy which we retrieved from the solar gets boosted upto 18%. Though due to unstable climatic conditions we are in a position to give pulses based on the output solar panel. so a proper controlling strategy has to be employed. In case of using wind power we just utilize a rectifier

DVR is a series compensation device that it performs the function such as Protect critical loads from all supply sides disturbances other than outages. Hence after the process of rectification the DC output is given as an input to the DVR-[6]. So the basic amenity of those functional unit is that DVR has the inverter operation that normally uses multilevel inverter.

The main purpose of the multilevel inverter possibly reduces the harmonic distortion. Thus DVR is best suitable device that is opted for load and also grid integration. Thus the block diagram clearly explains the working scenario of the system which helps to integrate the whole structure with the grid-[11].

The switching periods are quite important that helps series connected DVR to make the all sorts of control over active and reactive power flow from the DVR to grid-[2]. It helps in making the need to absorb and then supply the reactive power at suitable time.

3.1 BASIC PRINCIPLE OF DVR

The major work of DVR is to voltage and frequency at desired magnitude. Such that even at the unbalanced voltage we are able to have great control over load-[12].

DVR is basically a solid state switch which is designed in order to regulate the voltage at the optimum level-[13]. It is normally connected in distribution point at common coupling by means of fixing a position between feeder and the supply area of system.

Apart from having control on voltage sag and swell it has a great deal in compensating supply voltage harmonics, load harmonics and also controls the load side power flow-[4]. It also facilitates the proper control over flexibility in load side. The power wastage is completely avoided so as to achieve maximum efficiency.

DVR is series compensation Flexible AC Transmission system device. Restore the load side voltage for its grid connection-[15]. Avoid the wastage of power in transmission line. The purpose of the MPPT system to sample the output of the turbine and apply the proper resistance to obtain maximum power for any given environmental conditions.

3.2 CIRCUIT DIAGRAM

DVR is normally lies in between the grid and distribution system is shown in fig.3. MPPT technique was normally planned in wind turbine in order to maintain the optimum power transfer by means of controlling rotor speed-[5]. The purpose of MPPT is to obtain the

sample output there by providing proper resistance to get the maximum power at various climate condition-[9]. There are many types of control strategies available in converter control but the based on the reference and the conditions like less peak over shoot are the necessary criteria for maintaining the choice of control scheme-[8].

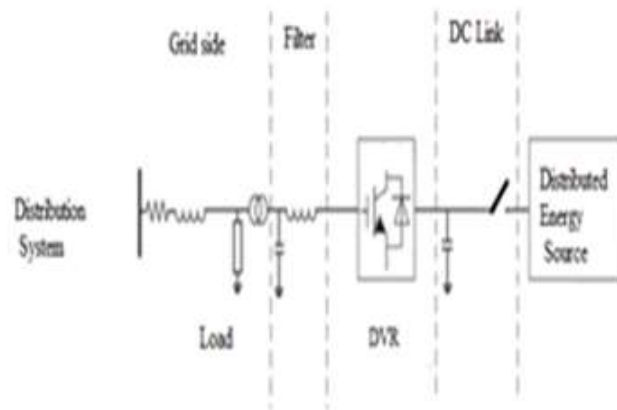


Fig .3 Circuit Diagram of Proposed System

In the operating condition the cell maintain the voltage and current by means of maintaining fill factor. This information is frequently used to assess the most extreme power that a cell can furnish with an ideal load under given conditions, $P = FF \cdot V_{oc} \cdot I_{sc}$. For most purposes, FF, V_{oc} , and I_{sc} are sufficient data to give a valuable rough model of the electrical conduct of a photovoltaic cell under run of the mill conditions.

In the working condition the cell keep up the voltage and current by methods for keeping up fill factor. These qualities compare to a specific load protection, which is equivalent to V/I as determined by Ohm's Law-[6]. The power P is given by $P = V \cdot I$. A wind turbine ordinarily goes about as a present source to keep up the heap bend.

In any case, at a breeze speed MPP locale, its bend has an around reverse exponential connection amongst current and voltage-[7]. From fundamental circuit hypothesis, the power conveyed from or to a gadget is upgraded where the subsidiary (graphically, the incline) dI/dV of the I-V bend is equivalent and inverse the I/V proportion (where $dP/dV=0$). This is known as the greatest power point and compares to the "knee" of the bend. These values correspond to a particular load resistance, which is equal to V/I as specified by Ohm's Law-[6]. The power P is given by $P = V \cdot I$. A wind turbine normally acts as a current source to maintain the load curve.

The wind speed and the MPP are related to current and the voltage inversely-[2]. The basics of the circuit the derivative function is given (graphically, the slope) dI/dV of the I-V curve is equal and opposite the I/V ratio (where $dP/dV=0$).

3.3 CASCADED MULTILEVEL INVERTERS.

In each level of inverter there are four switches is shown in fig.4. Utilizing the best level as the case, by turning ON S1 and S4, yields $V_1 = +V_{dc}$. By Turing ON S2 and S3, yields $V_1 = -V_{dc}$. Killing all switches yields $V_{dc} = 0$ -[9]. Correspondingly, the AC yield voltage at each level can be acquired in a similar way.

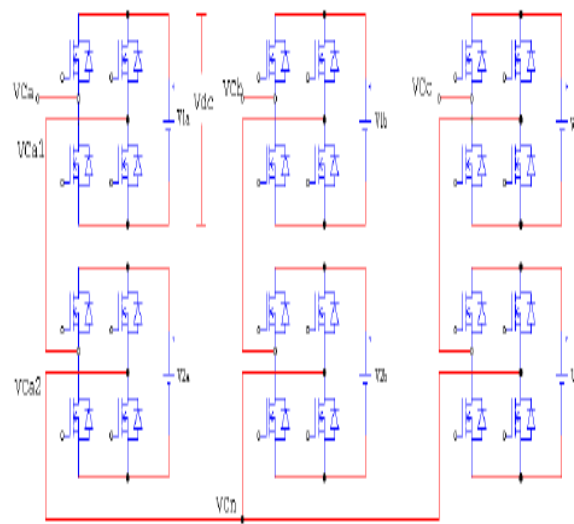


Fig.4 Basic Structure of the Cascaded Inverter

The reenactment work fundamentally centers around the correlation of different level of inverter in view of the fell multilevel inverter with variety in extent.

The correlation is done based on yield Total Harmonic Distortion, principle and consonant of the RMS voltage and info DC usage. Reproduction for the most part centers around the multilevel inverter bolstered with DVR.

On account of PWM method ordinarily the exchanging recurrence is contrasted and the bearer . In the multilevel PWM, the exchanging recurrence can be not exactly or more noteworthy than the bearer recurrence and is a component of the removal point between the transporter set and the adjustment waveform..

The general structure of the multilevel converter is to orchestrate a close sinusoidal voltage from a few levels of DC voltages-[8]. As more advances are added to the waveform, the consonant twisting of the yield wave diminish, moving toward zero as the quantity of levels increments.

Inverter is a normal PWM inverter supported by PWM so as to eradicate unwanted disturbances and also the proper topological maintenance that output from three phase inverter is measure and compared and then fed into three phase measurement from which it is continuously measured. Its output is found to 220V per phase.

4.SIMULATION DIAGRAM OF THE PROPOSED SYSTEM

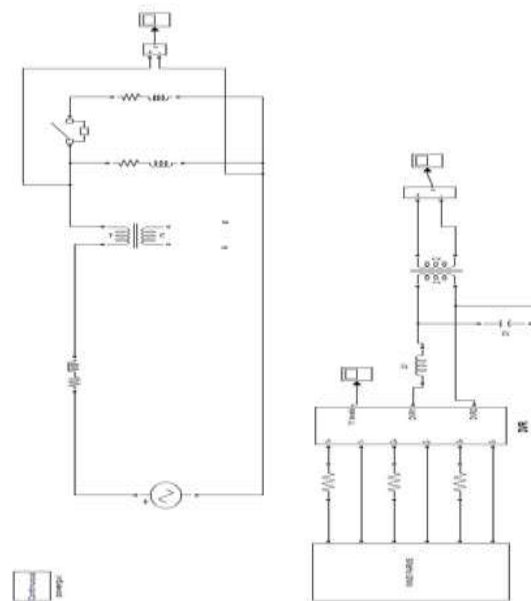


Fig. 5 Simulation Diagram of an eleven level Inverter without DVR

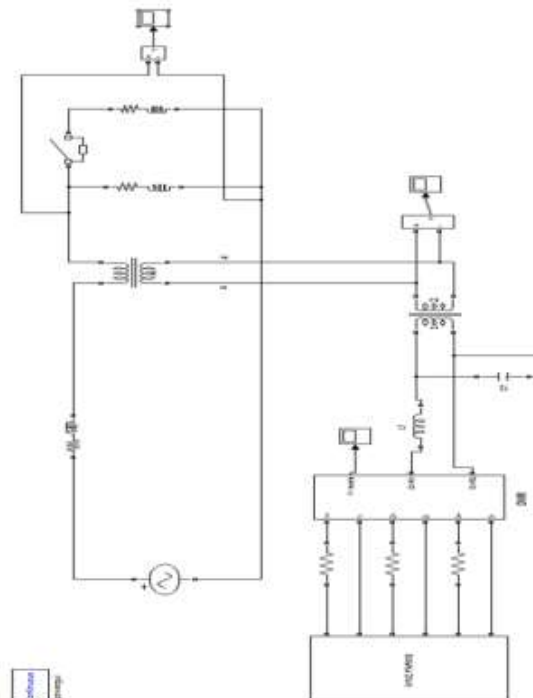


Fig. 6 Simulation Diagram of an eleven level Inverter with DVR

5.SIMULATED RESULTS

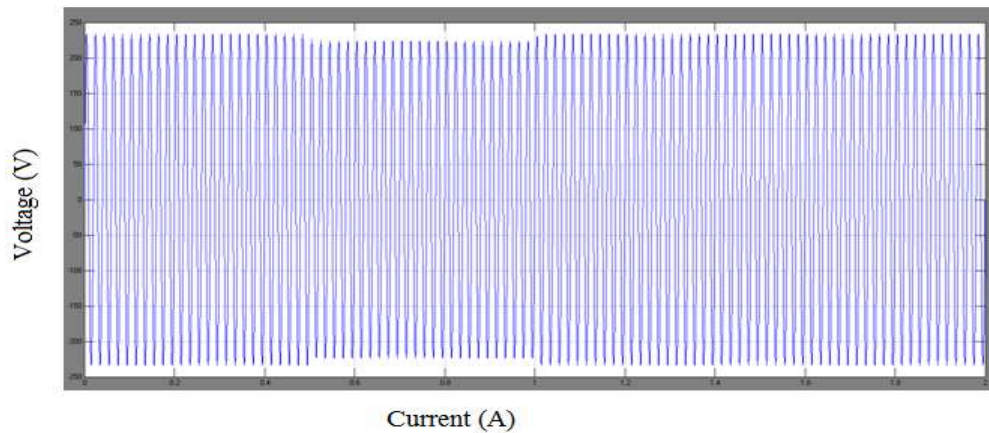


Fig .7 Output Waveform without DVR

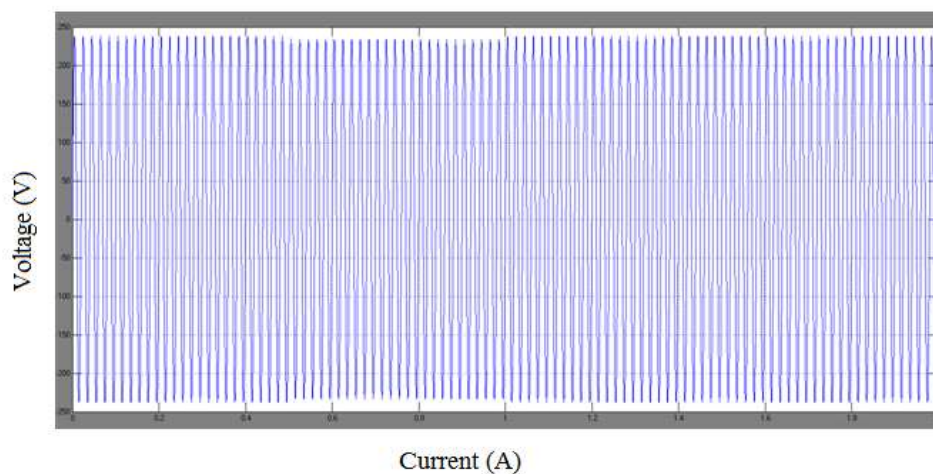


Fig. 8 Output Waveform with DVR

The simulation results which are shown in fig .7and fig .8 clearly suggests

6. CONCLUSION AND FUTURE SCOPE

Multilevel inverter with the combination of renewable source is very compact for designing.. The proposed topology is verified through the results obtained-[1]. The presented topology is suitable for medium power applications .The active and reactive power is regulated for the improvement of power quality and also reduces the power quality problems. The MPPT algorithm is used to converts the output power of the renewable source.

The proposed converter adjusts real and reactive power by means of controlling the power angle. Finally it should be noted that the power quality problems are reduced. A scheme needs to be developed and further investigated to make the inverter level increases

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