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A Review: High Performance Constant Power Generation in PV Connected Grid System

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Abstract: *An advance power control by limiting the maximum feed in power of PV has been fast and smooth transition between MPPT and CPG. less of the solar irradiation level, high performance and stable operation are always achieved by using solar control strategy system. It can be regulated the PV output according to any set point and force the PV system to operate at the maximum power point without stability problems. Main purpose of using a grid connected PV system they are performed high constant power generation. In PV system controlled whole system a generation constant, high accuracy and stable transition.*

Keywords: MPPT, CPG, PV, Solar System

I. INTRODUCTION

The fulfillment of the power generation constant and maximum power develop goal were possible to modern power system able to find innovative technology that have success become technology developments. Using MPPT and optimize power generation while achieving maximum profits and achieving minimized cost. For some instruments likes MPPT (maximum power point tracking), renewable solar energy array etc. fall into the above category. Using MPPT (Maximum Power Point Tracking) and power generate operation is mandatory for grid connected PV systems in order to maximize the energy yield. More PV system installation requires to advance power control schemes as well as the regulations in order to avoid impacts.

Renewable energy sources act in which the PV system with the rated power below 30 kWp which have the limit for the maximum which is feed to the power (70% of the rated power) which can controlled by the utility like the active power control which the referred as the constant power generation (CPG) control or absolute power control which is describe in the grid which CPG concept which have been presented which is the reveals by the most co-effective way achieved the CPG control is by modifying the MPPT algorithms at the PV inverter level.

MPPT or maximum power point tracking is algorithm that included in charge controllers used for extracting maximum available power from PV module under certain condition. The voltage at which PV module can produced maximum power. The MPPT charge controller ensures that the loads receive maximum current to be used (by quickly charging the battery). Maximum power point could be understood as an ideal voltage at which the maximum power is delivered to the load, with minimum losses. This is also commonly referred to peak power voltage. The MPPT operating voltage range is within 250-850V.the centralized inverter adopt. The single stage structure and its output voltage has 270V,351V,400V and other specifications. This is a relevant for areas with low irradiation or during winter with fewer hours for sunlight. They provide increase in charging efficiency up to 30%.

HERIC INVERTER

The HERIC (**Highly Efficient and Reliable Inverter Concept**) inverter is used in the design because of its advantages: high efficiency and safety by reducing the leakage ground current when the inverter is connected to the national grid without using a transformer. In a photovoltaic system, the inverter functions as a power converter to connect the PV module to the grid. PV-inverter is an important element with the main function is to convert the DC

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voltage that has been generated into AC voltage in sync with the grid. To support its operations, PV-inverters have complex devices and mechanisms, including DC-DC converters on the input side, MPPT, anti-islanding, output.

SOLAR PANELS

When the sun shines onto a solar panel, energy from the sunlight is absorbed by the PV cells in the panel. This energy creates electrical charges that move in response to an internal electrical field in the cell, causing electricity to flow. Photovoltaic modules, commonly known as solar panel. web that captures solar power to transform it into sustainable energy. A semiconductor material, usually silicon, is the basis of each individual solar cell. In a typical module, **36 cells** are connected in series to produce a voltage sufficient to charge a 12V battery. The voltage from the PV module is determined by the number of solar cells and the current from the module depends primarily on the size of the solar cells.

BOOST CONVERTER

A boost DC-DC converter is used to control the solar PV power. The boost converter operates in both MPPT mode and voltage control mode. The voltage control mode is used only when load power is less than the maximum power generated by solar PV plant given the incident irradiance and panel temperature.

II. LITERATURE REVIEW

Power generation is the term of power system, they are including with maximum power generation using the renewable sources less loss of power. power system constant power generation with grid system installation by solar energy uses fast solar tracked system by **A Ahmed**, **L. Ran, S. Moon, and J.-H. Park,** "A fast PV power tracking control algorithm with reduced power mode," IEEE Trans. Energy.

The concept of power system the power was introduce by **V. AGRAVAL** the term of custom power means the utilization of power generation from solar modules they are connected with grid system. Issues of power quality, active power, reactive power, power losses grid system maintenance are including part in generation

Main problem of power grid system increasing reactive power from PV inverter usually operate at unit power factor at a maximizing the active power generation by TESHRAM.

K.H. Hussein et al. [3] introduced a new Maximum Power Point Tracking (MPPT) algorithm that compares the continuous and instantaneous conductivity of the material of the PV array to monitor the Maximum Power Operating Point (MPOP). The author of this paper discovered some flaws in the Perturb and Observe approach and demonstrated that the Incremental Conductance algorithm effectively monitored the MPOP. The work was carried out by both simulation and graphs.

S, GOTEKAR [11] proposed the power problem in steady state conditions in power quality problems in grid system inverter also harmonics into the system in presence of nonlinear loads during DC to AC loads on that time as a result the reactive power demand met by the PV system is minimal. The grid is a responsible for supplying majority of reactive power and it makes the distributions transformer operate at a low power factor

P.L. CHAPMEN [10] In power grid system the condition when the solar system continuous to supply to the even through grid power from utility is not presents is islanding.in grid connected system islanding dangerous to utility workers who may not realize that the circuit was energized while working condition and maintenance so islanding detection problems are occurs in power grid system

Reverse power-controlled difficulty in power system and voltage-controlled difficulty are main problem in power generation grid connected system and reverse power flow of system

PAYAL SOMANI [6] Using heric inverter in power grid system on that time transformer are not uses to power transfer from generation to grid side system they are using heric inverter uses they are high reliable condition in power system they are make more reliable whole system, design pf heric inverter of single-phase transformer they are using less photovoltaic cells.

A.V TIMBUS ingerman law of using a renewable energy sources and power generate Power system analysis, renewable energy sources by **V.K. MEHTA**

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Ariya yang, sang Goswami IEEE transaction on power electronics publication **D.ARVIND** international journal of advance research trends in engineering and technology.

III. SCOPE OF WORK

From the literature review, it is an observed that power quality is major area and concern for power engineering now days, reliability of power supply is most important for the utility to achieved global benefits. Different types of component and different types methods are used and improve the power quality in power generation system, maintain the power, voltage, utility is the most responsible for maintaining current profiles. Different technology uses and methods are used and making more reliable system and power delivered from grid sides in power system, power system generation and distribution losses decrease and making more efficiency of power generation. Main point of maximum power generation and maximum constant power generation using MPPT, HERIC inverter and maximum track point sets and power generate from solar modules in less losses and steady state condition.

IV. OBJECTIVES AND CONTRIBUTIONS

The main objectives of the thesis are to renewable energy source it means using solar energy and using MPPT they are maximum power tracked from solar module or solar cells and generate the maximum and constant power generation
Using renewable source solar energy used in this system and power generated by solar cells or solar module
Maximum power generation using MPPT they are maximum power point tracked and set the maximum point so on that that time power generation is maximum
Improve power quality in system steady state condition
Using MPPT and developed a constant power generation from this system.

V. CONFIGURATION OF MPPT SOLAR CHARGE CONTROLLER

Typical PV module produces power with maximum power voltage of around 17 V when measured at a cell temperature of 25°C, it can drop to around 15 V on a very hot day and it can also rise to 18 V on a very cold day.A MPPT solar charge controller **is** the charge controller embedded with MPPT algorithm to maximize the amount of current going into the battery from PV module. MPPT is DC to DC converter which operates by taking DC input from PV module, changing it to AC and converting it back to a different DC voltage and current to exactly match the PV module to the battery.

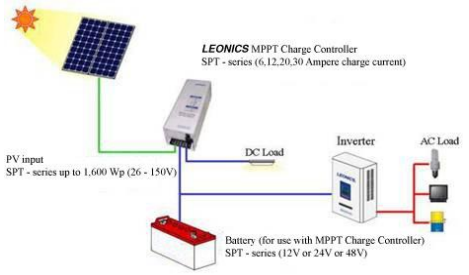

Fig. 1 Solar Charge Controller

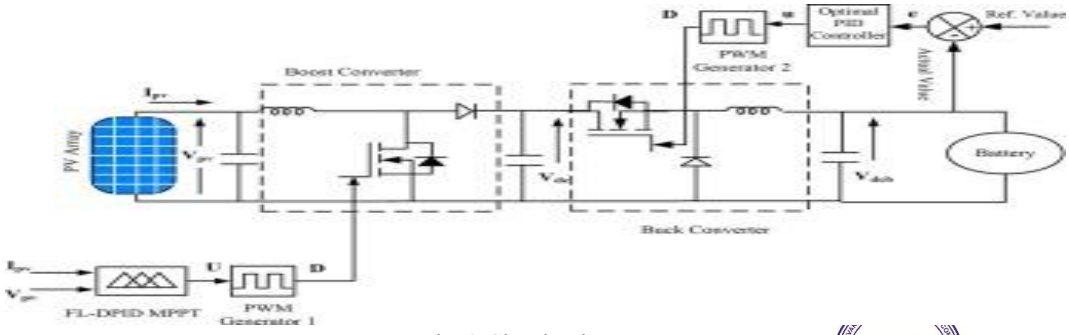

Fig. 2 Circuit Diagram

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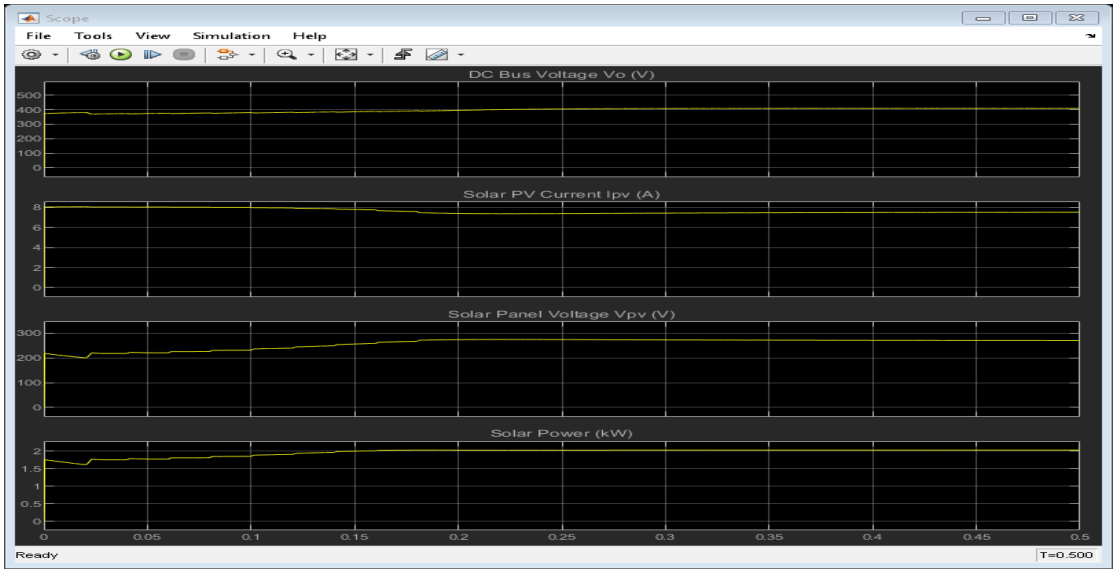
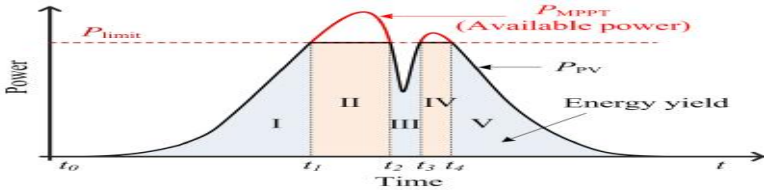
MPPT is DC to DC converter which operates by taking DC input from PV module, changing it to AC and converting it back to a different DC voltage and current to exactly match the PV module to the battery.

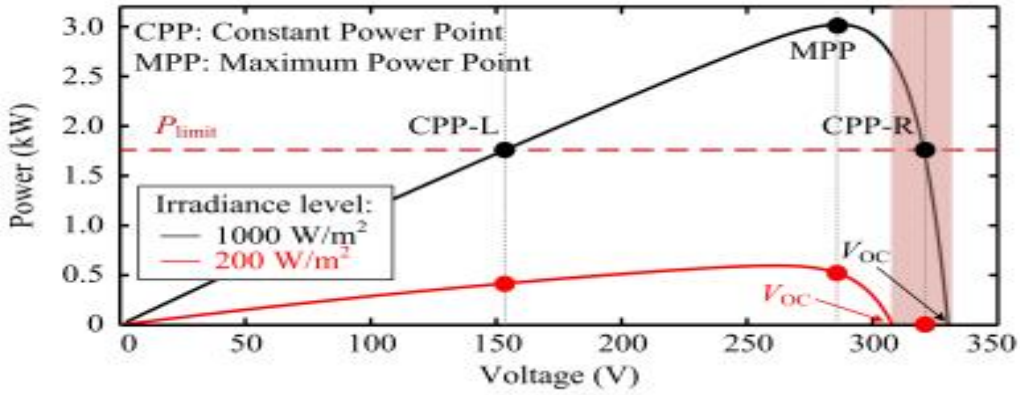
VI. SIMULATION OUTPUT OF MPPT



VII. MPPT CONSTANT POWER GENERATION



VIII. CONSTANT POWER GENERATION (CPG) CONCEPT



control is limited to be at the right side of the Maximum Power Point (MPP) of the PV arrays (CPP-R), Due to the single-stage configuration. Unfortunately, this decreases the robustness of the control algorithm when the PV systems experience a fast decrease in the irradiance. The operating point may go to the open-circuit condition as illustrated This

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drawback applies also to other CPG algorithms presented since all the control algorithms regulate the PV power Ppv at the right side of the MPP.

IX. SOLUTION OF REVERSE POWER FLOW

High performance power generation many problems are occurred in grid connected PV system I have explain and find reverse power flow of PV connected grid system

Using RPR (REVERSE POWER RELAY) and solving reverse power flow in system RPR is the connected at the coupling point of grid and load side When RPR sense any reverse power it will generate a signal which can be used to trip any contactor and breakers or grid solar inverter The solar power plant will be completely shut down as long as there is a trip signal from RPR

Simulation of reverse control power

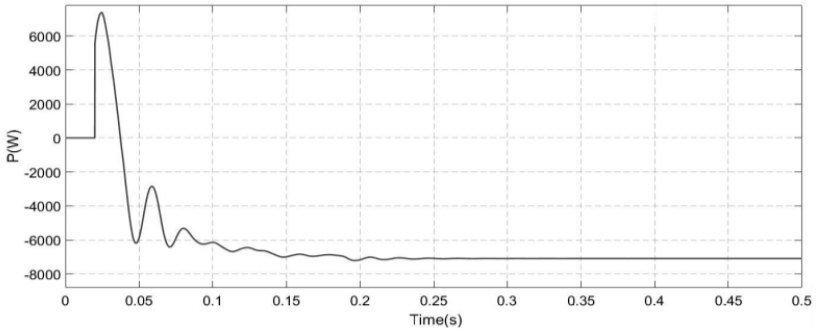

Figure 7. Waveform of active power in PCC.

The effect of reverse power control mode was verified by the following simulations: the waveform of active power in PCC was shown in Figure. Positive power value. represented the normal direction of the power flow, while negative power value meant the presence of reverse power.

The active power consumption of load PL was less than active power output from PV system PDC, so the reverse power Pr occurred which was about 7kW. The waveforms of VPCC under power factor control strategy and the proposed reverse power control mode were shown in Figure.

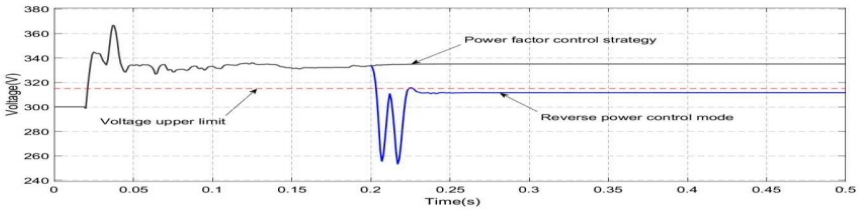

Figure 8. The waveforms of V_{PCC} under power factor control strategy and reverse power control mode.

The standard value of VPCC was set at 300 V, the upper limit of voltage fluctuation was set to 105% (i.e., the upper limit of voltage fluctuation is 315 V.) which was shown by red dotted line in . The gray curve was the waveform of VPCC under the power factor control strategy. It can be seen that, due to the emergence of reverse power, VPCC rose over the upper limit which was 315 V, and ultimately stabilized at about 335 V. The rate of deviation from the standard value was as high as 11.67%. The blue curve was the waveform of VPCC under the proposed reverse power.

control mode which came into operation at 0.2 s. When the proposed reverse power control mode came into operation at 0.2 s, VPCC was only dropped significantly after fluctuating for a short period of time (about 0.03 s). VPCC was stabilized at around 311.5 V, and the deviation rate was reduced to 3.83%.

The quantity of reactive power consumed was calculated., as shown in Figure After the proposed reverse power control mode came into operation at 0.2 s, the quantity of reactive power consumed was 20kVar which was a value of −2×104Var after 0.2 s in Figure.

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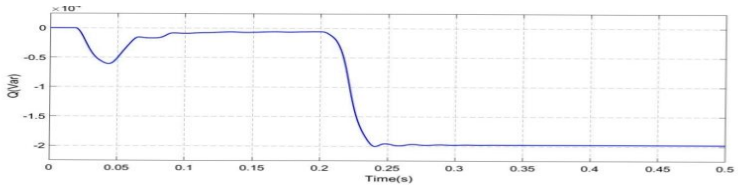
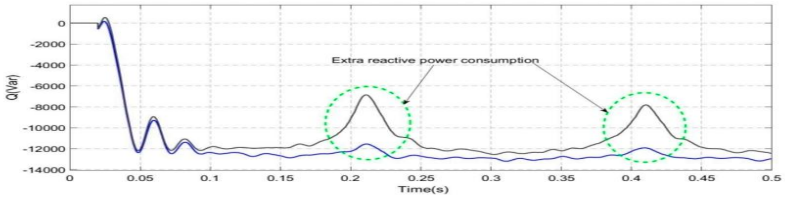


Figure 9. Waveform of reactive power consumption in PV inverter under reverse power control mode.

The proposed reverse power control mode had a significant effect on the mitigation of VPCCrise caused by the reverse power, and the deviation rate was decreased by 7.84% compared to power factor control strategy. Reaction time was only 0.03 s, which showed that the control mode can adapt to real-time voltage control needs of a rapidly changing PV system.

The gray and blue curves were the waveforms of reactive power consumption under the power factor control strategy and the proposed cloudy control mode.



Waveforms of reactive power consumption in PV inverter under power factor control strategy and cloudy control mode.

X. CONCLUSION

A high-performance active power control scheme by limiting the maximum feed-in power of PV systems has been proposed in this letter. The proposed solution can ensure a stable constant power generation operation.An advanced power control strategy by limiting the maximum feed-in power of PV systems has been proposed, which can ensure a fast and smooth transition between maximum power point tracking and constant power generation (CPG). Regardless of the solar irradiance levels, high-performance and stable operation are always achieved by the proposed control strategy. It can regulate the PV output power according to any set point, and force the PV systems to operate at the left side of the maximum power point without stability problems. Experimental results have verified the effectiveness of the proposed CPG control in terms of high accuracy, fast dynamics, and stable transitions.

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