

PCC VOLTAGE COMPENSATION OF PV INVERTER WITH ACTIVE POWER DECOUPLING CIRCUIT

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Abstract:

The objective of propose a novel PV micro-inverter with PV current decoupling (PVCD) strategy to achieve maximum power point tracking (MPPT) performance without using large electrolytic capacitors. Conventionally, the grid-connected PV micro-inverter needs a large PV-side electrolytic capacitor to suppress the double-line frequency voltage ripple, which is caused by the injected AC grid power, to achieve the desired MPPT performance. However, the short lifetime electrolytic capacitor will reduce the PV micro-inverter's reliability dramatically. Therefore, different active power decoupling circuits (APDCs) have been proposed in published to reduce the required input capacitance so that the long lifetime film capacitor can be used to replace the electrolytic capacitor, which is based on the concept of current decoupling instead of power decoupling, is proposed to simplify the control mechanism of the PV micro-inverter. Furthermore, to accomplish the proposed current decoupling concept, a novel circuit topology for the PV micro-inverter is also proposed control strategy is modeled and simulated in MATLAB and simulation platform.

Keywords: MPPT, PVCD, PV micro-inverter, MATLAB

I.INTRODUCTION

In interest in natural energy among power electronics authorities has grown in response to increased concern for the environment. Many types of electrical converter circuits and their management schemes for electrical phenomenon (PV) power generation systems are studied. Especially on the use of residential PV power generation system, single-phase utility interactive inverters have usually been used. In this case, voltage pulsation, which is caused by the single-phase power generation to the utility line, appears on the dc input bus. The large voltage pulsation causes the fluctuation of the operation point of the Photovoltaic module and hence the overall generation

power is decreased. In order to prevent the problem, an electrolytic capacitor of large capacitance has been connected on the dc input bus in order to reduce the voltage pulsation. The function of reducing the power pulsation on the dc bus is called as "power decoupling". However, this is not a realistic solution when we are taking the volume and the cost into consideration. The authors have been studied inverter circuit topologies that enable the power decoupling function by using small dc capacitors and switching devices and other valuable topologies are proposed. Those methods are called as "active power decoupling (APD)", and successful in the power decoupling capability and reduction of volume and weight of the inverter setup. But those still

have the problem of lower conversion efficiency compared to conventional one. In order to overcome this problem, this presents a novel power decoupling function which can achieve high-efficiency on a single-phase inverter circuit. A most distinctive feature of the proposed system is that loss generated in the power decoupling circuit is minimized. A control method utilizing a rotational frame control suitable for the proposed inverter is also proposed. Effectiveness of the proposed inverter is verified through P-SIM simulation and experiments on prototype.

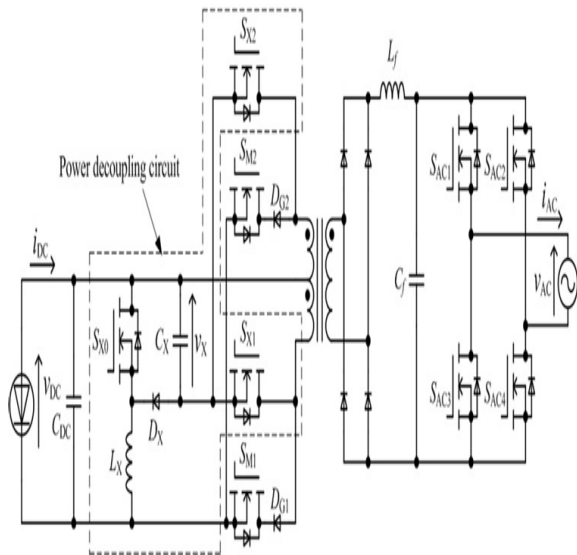


Fig. 1. Main circuit configuration

II. CONCEPTS

The objective of propose a novel PV micro-inverter with PV current decoupling (PVCD) strategy to achieve maximum power point tracking (MPPT) performance without using large electrolytic capacitors. Conventionally, the grid-connected PV micro-inverter needs a large PV-side electrolytic capacitor to suppress the double-line frequency voltage ripple, which is caused by the injected AC grid power, to achieve the desired MPPT performance. However, the short lifetime

electrolytic capacitor will reduce the PV micro-inverter's reliability dramatically. The different active power decoupling circuits (APDCs) have been proposed in published to reduce the required input capacitance so that the long lifetime film capacitor can be used to replace the electrolytic capacitor. Unlike the traditional APDC with charging and discharging modes operation, a completely unique PVCD strategy, that is predicated on the construct of current decoupling rather than power decoupling, is projected to change the management mechanism of the PV micro-inverter.

ADVANTAGES:

- It converts solar energy directly into electrical energy without going through thermal mechanical link. It has no moving parts.
- Solar PV systems are reliable, macular, durable and generally maintenance.
- It can be located at the place of use and distribution network is required.

III. BLOCK DIAGRAM

The word electrical phenomenon combines 2 terms – ikon suggests that lightweight and voltaic suggests that voltage. The electrical phenomenon energy is obtained from sun lightweight within the style of alternative energy. The sun lightweight is formed to be targeted on star panels that has the flexibility to convert the alternative energy to associate degree voltage. The conversion of alternative energy to Associate in Nursing voltage is finished by star cells of the solar battery. A solar battery may be a set of star electrical phenomenon modules electrically connected and mounted on a construction. An electrical phenomenon module may be a packaged, connected assembly of star cells. The solar battery may be used as a part of a bigger electrical phenomenon system to get and provide electricity in industrial and residential applications. every module is rated by its DC

output power beneath customary take a look at conditions (STC), and generally ranges from one hundred to 320 watts. The potency of a module determines the realm of a module given a similar rated output - associate degree 8 May 1945 economical 230 watt module can have double the realm of a 16 PF economical 230 watt module. one star module will turn out solely a restricted quantity of power; most installations contain multiple modules. A electrical phenomenon system generally includes a panel or associate degree array of star modules, associate degree electrical converter, and typically electric battery and/or star huntsman and interconnection wiring.

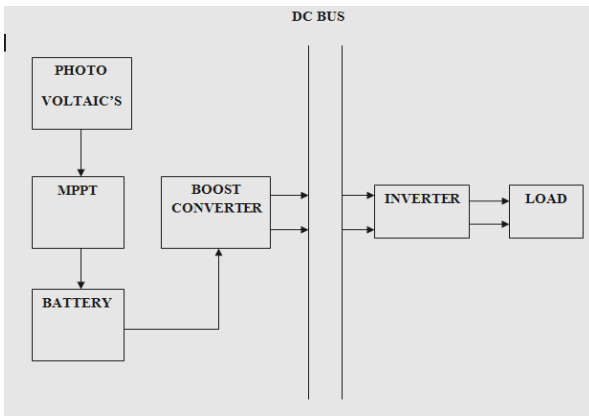


Fig.1 Schematic diagram

IV.RESULT AND DISCUSSION

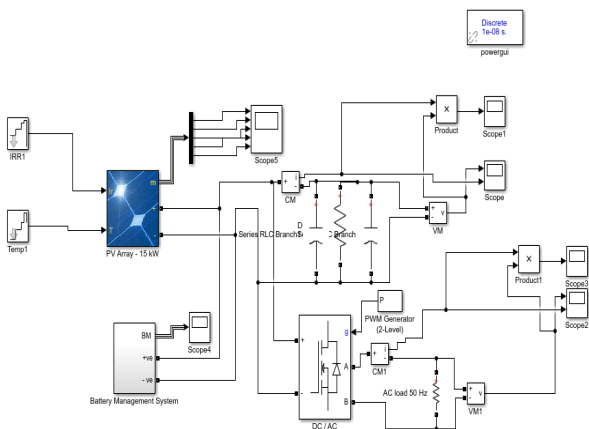


Fig.2.PCC Voltage Compensation of PV Inverter with Active Power Decoupling Circuit

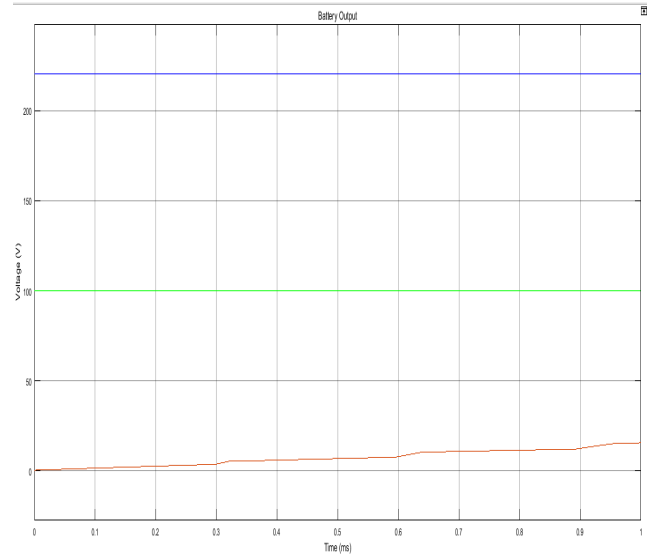


Fig 3 Battery Output Voltage Waveform

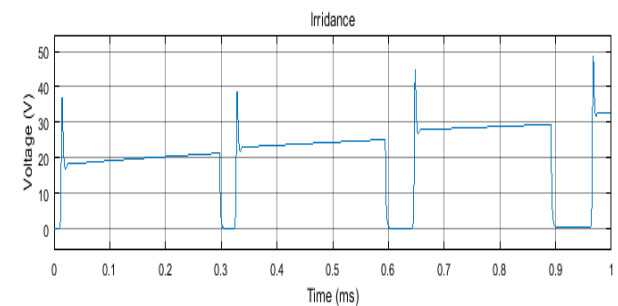
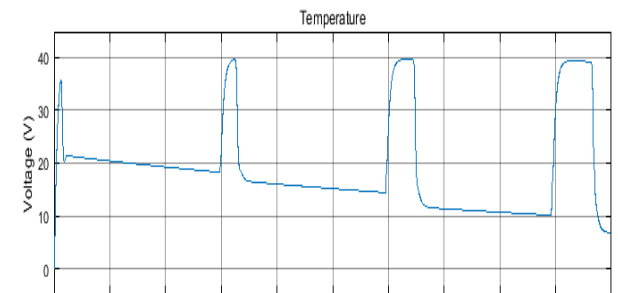
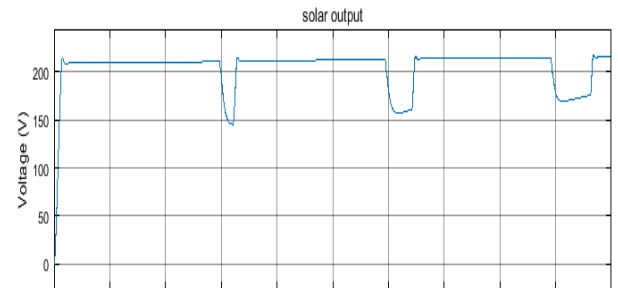


Fig 4.solar output voltage waveform

V.CONCLUSION

A single section fly back primarily based micro-inverter with new active power decoupling has been projected configuration is simulated at an influence level of exploitation MATLAB-SIMULINK software system. The active power decoupling theme is in a position to supply the double grid frequency power part to the grid whereas reducing the specified decoupling electrical device value. Thus, the PV facet voltage has very low ripple, that improves the MPPT efficiency. constant circuit is employed to recover the outpouring energy of primary coil at the moment once the most switch is turned on. thence the requirement for an additional passive or active arrogance circuit for clamping the voltage across the most switch is obviated. Simulation results of the projected micro-inverter are enclosed for realizing APDS and outpouring energy recycling; along side this in operation modes and management strategy also are enclosed.

VI.REFERENCES

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