

Solar PV cell with single phase inverter using battery balancing applications

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ABSTRACT

In this paper battery balancing with a single phase inverter is modeled and simulated. Each separate input directly connected to the battery. Photovoltaic system as input also involves the main conversion of sunlight to the electricity by the usage of modules in the Photovoltaic system. In this method each input has been connected to the power point tracker which is mainly to absorb power separately. Also the Inverter which reduces Total Harmonic Distortion (THD) and also used in battery based applications. This is more economical than the conventional multilevel inverter.

Keywords: Solar Photo voltaic (PV) Cell, Wind Generator, Battery bank, Total harmonic distortion, Renewable Energy Sources.

INTRODUCTION

Large capacity of energy storage system is used in battery bank applications. In the last few years, multilevel voltage source inverters have a viable solution for high power DC-to-AC conversion applications. Inverter is a linkage structure that has more input DC levels and semiconductor devices in a waveform by staircase type system. Also this inverter can be used for low power applications. It is mainly to increase the levels; hence it leads to large number of power semiconductor devices and driver devices. Hence it is used to increases complexity of the system and cost and it reduces reliability of the system and efficiency. Number of solar cells can be used for the input as such it can be stores energy normally. Also the battery balancing circuit is mainly to store the power which is converted into AC and passes through the power grid. When this topology used for Powered battery applications. The main components which is used in the renewable energy systems are,

- 1) **Maximum Power Point Tracker:** It is a technique which is grid connected inverters also solar devices which is used to get maximum possible power from PV cells.
- 2) **PV cell:** It is mainly to absorb light, which is mainly to generate electron hole pairs also the charge carriers can be separated with opposite types.

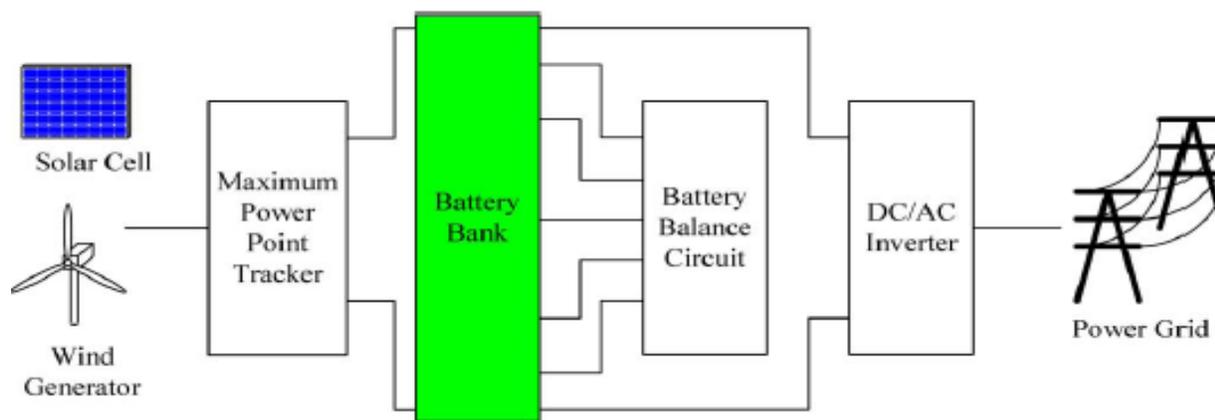


Fig.1. Renewable Energy Systems

Block diagram of proposed topology: It is a rechargeable battery. The secondary battery or storage battery where electrical energy is stored as a chemical energy and that energy can be converted into an electrical energy also

electrical source is called a battery charging. When the conversion of one particular energy to another energy with external load is known as secondary battery charging.

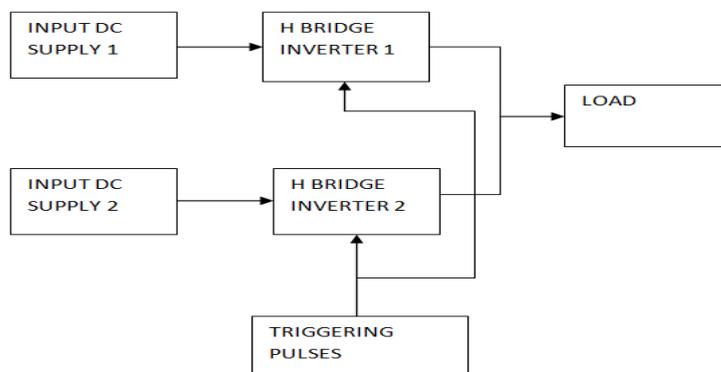


Fig.2. Block diagram of proposed system

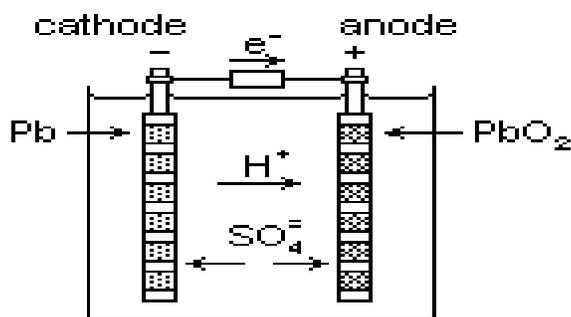
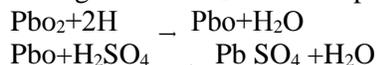


Fig.3. Lead Acid Storage Cell

When battery charging, the current has been passed through the chemical changes which occurs inside of the battery. Hence it absorbs energy for the formation of that, when the particular external load is connected to the battery and reverse direction takes place for the chemical changes. When the lead acid battery is dipping with the plate of lead peroxide and the plate of sponge with dilute sulphuric acid. When the +ve hydrogen ions and also the sulphate ions (negative). The PbO is reacting with the H₂SO₄ AND PbSO₄ and H₂O



The Total reaction takes place as,



When the battery has individual cells with different level of state of charge. Sometimes battery distribution is distinguished. Battery capacity is only limited by the weakest cell. Balancing is either active or passive depend upon the technology.

MATERIALS AND METHODS

Table.1. Operating Region Conditions

Function	Parameter	Conditions	MIN	TYP	MAX	UNIT
V _{REGION}	Supply voltage	No operating restrictions	2.9		4.8	V
C _{REGION}	Capacitor between VDS and LDO	Normal capacitor value inialized		0.8		μF
I _{CC}	Operating Normal mode current	Normal Gas Gauge			140	μA

Table.2. Temperature according to the Battery

Temp of battery	12Voltage Battery	6Voltage Battery
71 ⁰ F	8.621	4.89
62 ⁰ F	8.511	4.72
56 ⁰ F	8.440	4.50
0 ⁰ F	7.567	4.26

Simulation results:

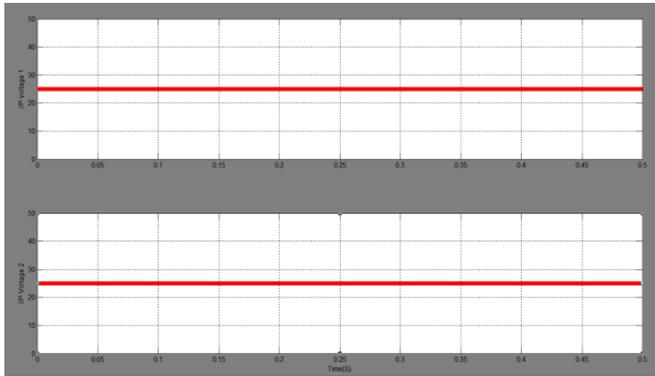


Fig.4. Input voltage

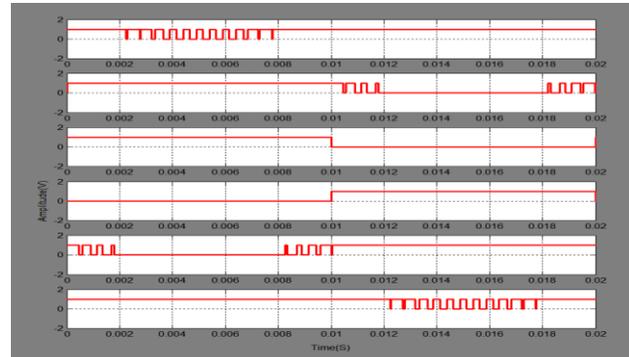


Fig.5. Triggering Pulses

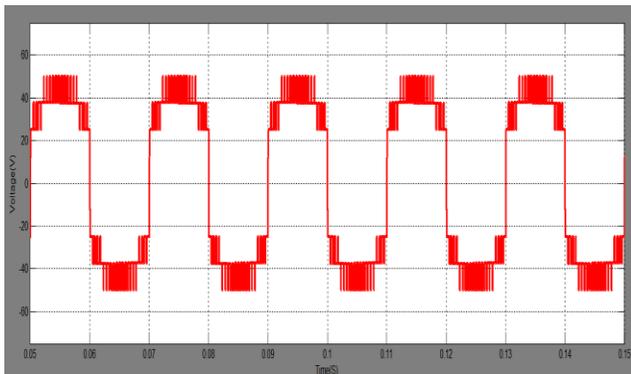


Fig.6. Output voltage

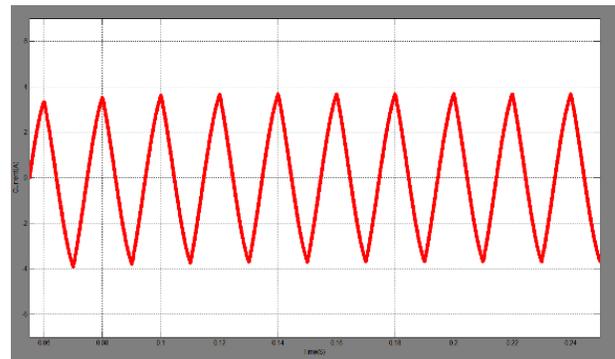


Fig.7. Output Current

By fundamental frequency the high voltage switches are operates, it increases the conduction loss. By this manner, it disturbing the switches and increases its total losses. For m level inverter, the alternative phase opposition deposition need m-1 carrier signals that has to be disposed phase with each other by 180 degree angle. In bipolar operation mode, the signals are displaced phase by 180 degree that for upper half and lower half having two values. Each generated carrier wave has same amplitude and frequency.

CONCLUSION

When the input of the Photovoltaic Cell stores energy in the battery bank also single phase inverter with battery balancing has been proved successful. When the each individual input has been directly connected to the battery. According to the batteries the combination of batteries can be controlled also voltage as to implement for the balancing battery function. This is the main advantage of this paper than the conventional method. The proposed Topology working principle is to be explained with mathematical calculations of the output voltage, voltage stress of the switches, source current and power losses of the switches. Hence the lead battery cell has to produces energy and the inverter has been produces output for the battery based applications.

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