

# EFFICIENT GRID CONNECTED INVERTER TO OVERCOME THE LOAD DISTURBANCE IN HYBRID ENERGY STORAGE SYSTEM

T.Thiruppathi<sup>1</sup> | S.Andal<sup>2</sup> | M.Varatharaj<sup>3</sup>

<sup>1</sup>(UG Scholar of EEE, Christ the king engg college, Coimbatore, India,thiruppathithangam05@gmail.com)

<sup>2</sup>( Assistant Professor of EEE, Christ the king engg college, coimbatore, India,andals18@gmail.com)

<sup>3</sup>(Head of EEE department,Christ the king engg college,Coimbatore,india, varatharaj\_ms80@rediffmail.com)

**Abstract**— Power has become an important source in our life as our need increases with demand. It became fourth basic need in this industrial area and is important to increase the source of energy. There are only two sources such as renewable and non-renewable energy sources, available in this world. Since the capital cost and transportation cost are high and also scarcity in source for non-renewable energy sources such as fossil fuels are increased, now human has to find an alternate for power generation with low capital cost investment. Renewable resources such as biomass, wind and sunlight are abundant in the world and reduce the risk of scarcity of non-renewable energy source demand. In this paper, photovoltaic array is utilized to supply the load. Interrupted power supply to load may reduce the output efficiency. In order to overcome this issue, DSP controller with boost converter along with a battery is employed to reduce the issue of interruption of power.

**Keywords**—: Photovoltaic array, Boost converter, DSP controller, Load, Power

## 1. INTRODUCTION

The renewable energy system which is used in solar power generation. The best feature of renewable energy system, it has less pollution into the atmosphere when they generate electricity. The solar energy is high efficiency and positive results. We are interfacing solar energy with grid. There are many types of renewable energy such as solar, wind, tidal etc. In this project proposes solar energy since it is convenient for us. Batteries are usually used as mid-term energy storage devices due to their relatively high energy density and low power density short-term high-power applications to cover large power fluctuation, Intermittent power supplies and instantaneous high load requirements, and find their place as a complement to battery. It is then Advantageous to combine these two energy storage device to accomplish better power and energy performance. Battery through a DC/DC converter that is necessary to achieve optimal performance. In another case, the battery is isolated from the load through a DC/DC converter, and the load voltage and the battery current are controlled by the converter. The solar input are convert the DC/DC electrical power supply from low voltage to increase the high voltage on the load. External source on the battery terminal are used in the bus side the battery voltage are dc power are stored another then load side we can connected. Inverter is a renewable energy output on the DC. The inverter is connected to the AC load side and then load disturbance overcome the DSP controller are used in AC load side. The use of inverter is same to convert from DC/AC this DC quantity is converted into AC quantity. The output of the AC is interconnected with the load power.

## 2. EXSITING SYSTEM

The system parameters on the response of the hybrid energy storage systems and to study the dynamic stability, which is widely used in power systems. In order to obtain better system performance, active batteries hybrid energy storage systems need further investigation. In this paper, we propose a novel energy management method in three control strategies and in three different conditions. The method is realized in a hybrid energy storage system comprising a battery as well as appropriate bidirectional DC/DC power converters. The proposed method is more flexible than previous methods. Under certain load situations, our strategies can determine the current sharing ratio of the battery. Moreover, in a specific control strategy, the power sharing ratios are dependent on the load. The paper is organized as follows. In Section 2, we describe several control strategies for the power sharing between the two energy storage devices. Section 3 presents small-signal modeling and frequency-domain analysis for the hybrid energy storage system. In Section 4, these control strategies with different conditions are verified and compared against each other through simulation studies. Frequency-domain analysis is validated through time-domain simulation based on the time-average model. The effects of the controller and system parameter variations on the system performance are also studied.

As mentioned before, small-signal modelling and analysis are frequently used as a tool to design the control loops and study the effects of system and controller parameter variations on system performance. Here, we consider a general case of the hybrid energy system which includes two storage devices and two DC/DC converters. The basic circuit diagram of the hybrid energy storage system is shown in, where the circuit parameters and variables are defined and the current source represents the

difference between the load current and the main power source current. Suppose the hybrid energy storage system is operating at a steady state point. Neglecting the switching transients and using the volt-second balance principle, a time-average model of the system can be obtained. By perturbing and linearizing the time-average model around the steady state operating point, it is possible to find a small-signal model as follows

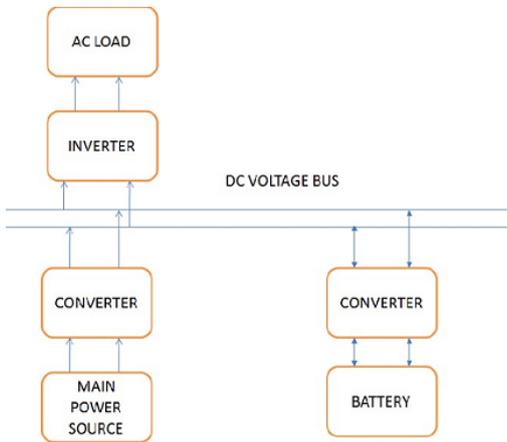


Fig.1.existing block diagram

3.PROPOSED SYSTEM

The input (12v) supply from boost converter which is used to the boost up the supply voltage. It is connected between the DC buses another side inverter supply from AC load. The additional battery source are connected in load demand are satisfied a battery terminal charging and discharging suppose main power source are supply demand and then battery voltage we can used the AC load The controller which is used to the load disturbance are overcome the efficient voltage in load. The selection of  $i_{b1}$  and  $i_{b2}$  depends on the different system loads and the specific requirement. On one hand, when the load variance is relatively large, is discharged and charged as a priority in order to cover load fluctuation. In such a case, and  $i_{b2}$  are set relatively low. On the other hand, when the average load is high but it has relatively small variance, the priority is to discharge and charge the battery. In this case,  $i_{b1}$  and  $i_{b2}$  should be set relatively large. If the is required to be highly charged in the steady state over time, then a relatively larger  $i_{b1}$  and a relatively smaller  $i_{b2}$  are chosen. Instead, if the battery is required to be highly charged over time, are latively smaller  $i_{b1}$  and a relatively.

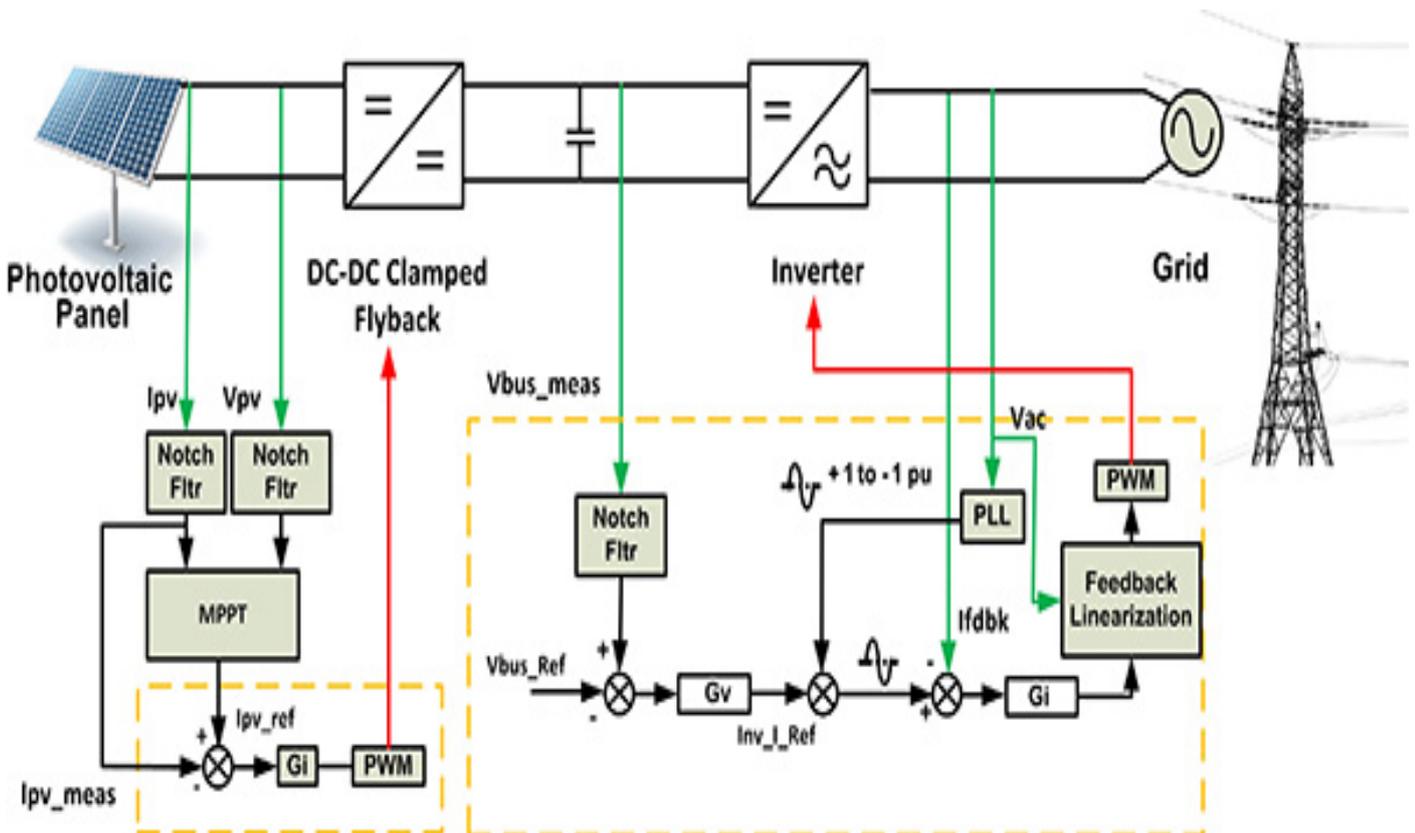


Fig.2. proposed system block diagram

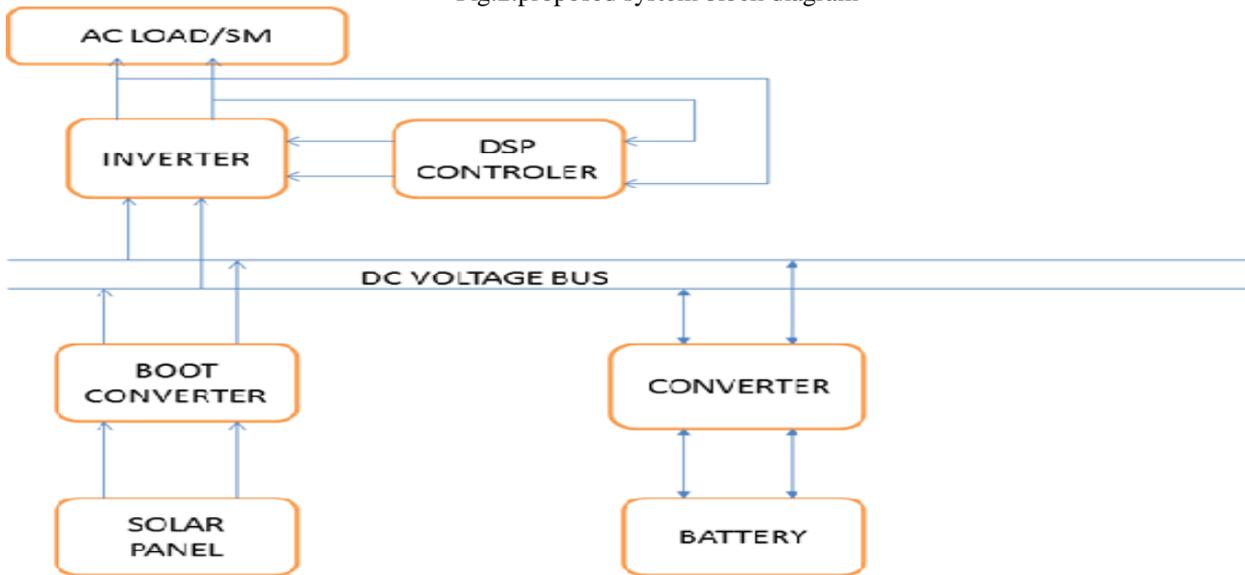


Fig.3. proposed system block diagram

Boost converters are essentially a step-up power converter that take in a low voltage input and provide an output at a much higher voltage. A block diagram of an ideal dc/dc boost converter

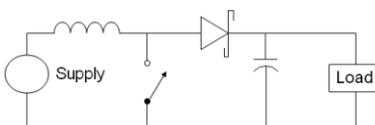


Fig.4. boost converter

An ideal boost converter is lossless in terms of energy, so the input and output power are equal. In practice, there will be losses in the switch and passive elements, but efficiencies better than 90% are still possible through careful selection of system components and operating

#### 4. PERFORMANCE ANALYSIS

The dc grid side connected in the inverter circuit used in closed loop control of PMSM motor load connected to the rpm is measured. Current controller using rated current are measured in the given to the reference signal PI controller used on normal current rating are measured PI controller. Sine wave generated in the PWM generator. Inverters switches are ON&OFF condition given to the current supply are rated current supply are equal condition satisfied on switching process continuous ON&OFF condition. The solar panel which is used to DC grid side connected to the power module of the solar panel power generated to the

parameters such as the switch frequency. The internal operations of a boost converter can be thought of as a charge storage and transfer mechanism. There are two states, on and off. More detail about these operations will be covered in section

To build this boost converter that meets the teams' specifications the team needs the power stage that will provide the 12V output from a 3.3V input. This circuit will be the daughterboard of the design. To set the desired frequency for this converter the teams needs to design a pulse width modulation (PWM) circuit up to 20MHz to drive the boost converter. A third circuit is needed to compensate for any variation in the output. This stage is called the error amplifier or control loop and monitors the output for a constant  $V_{out}$ . These three different stages make up the design for a high frequency DC/DC boost Converter with a control loop.

load connected another additional source are connected in battery terminal opposite direction are connected. Suppose Solar powers are less than stored power of battery supply will be used in the load side automatic current flows through load to supply voltage.

The small-signal equivalent circuit of the hybrid energy storage system is shown in. This model takes into account the effects on the currents of a variety of factors such as the voltage-current characteristics of individual energy storage devices, power converter and filter parameters, and controller parameters. The proposed model considers the variations in the battery current, the current and DC bus.

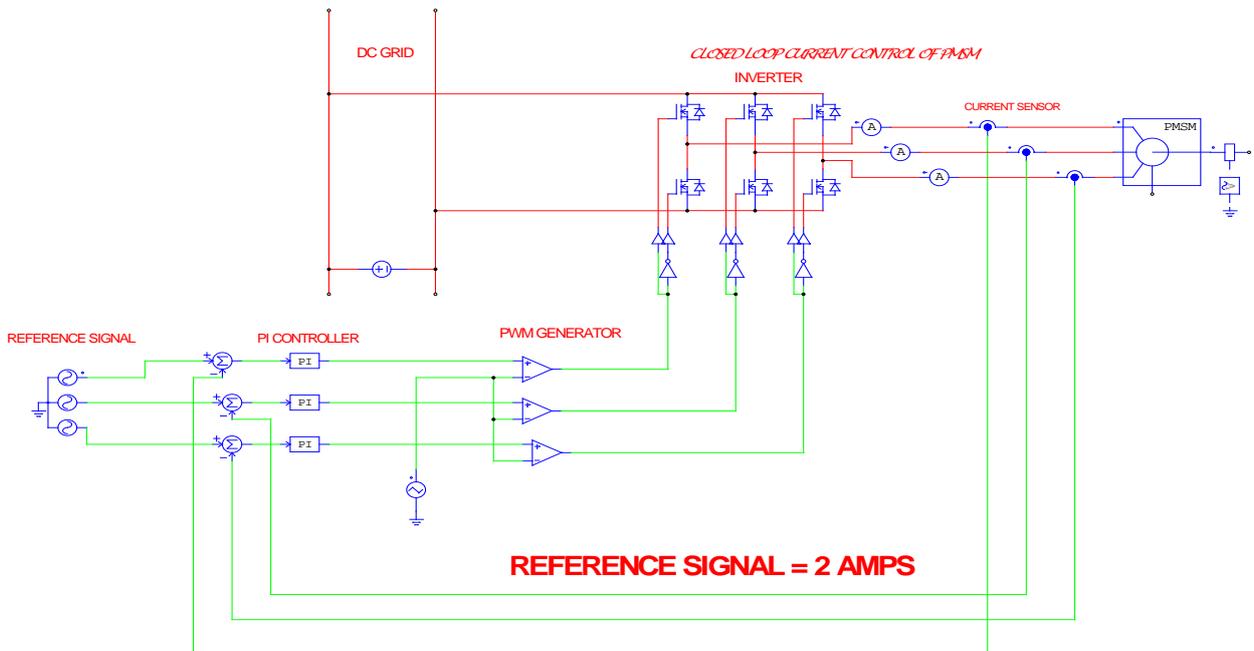


Fig.5.proposed system simulation

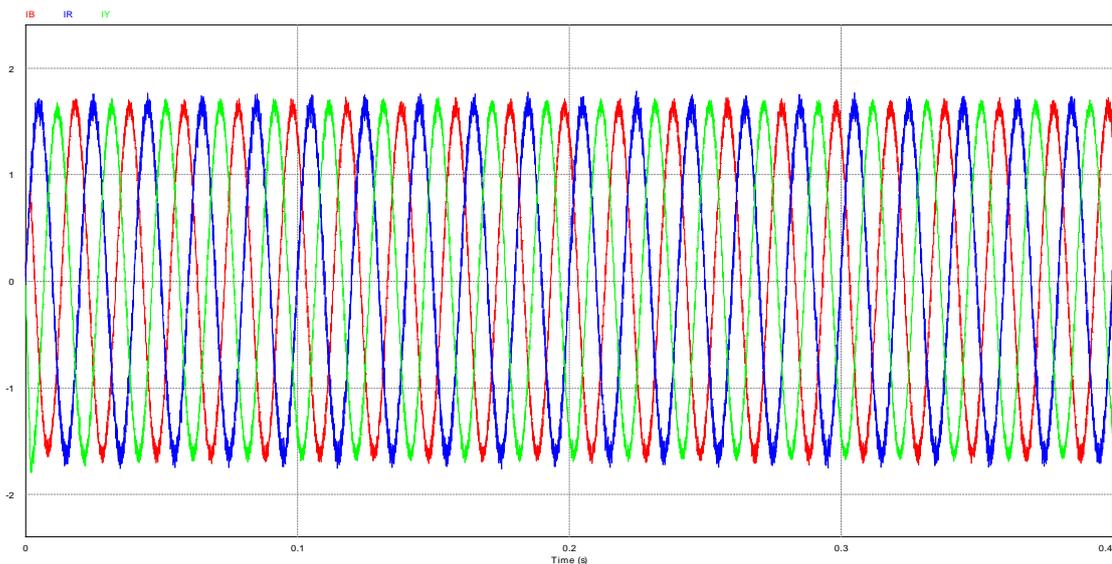


Fig.6.proposed system simulation output

**3. CONCLUSION**

This model takes into account the effects of many factors on the currents, such as the voltage current characteristics of individual energy storage devices, power

converter and filter parameters, and controller parameters. The effects of the controller and system parameter variations were studied in order to help designers to define control parameters, filter inductance and capacitance for

improved performance of the system. In practical application, as an energy buffer, the hybrid energy storage system, comprising a solar panel and a battery, can provide transient power and meet peak load requirements. It is necessary to smooth out the intermittent power generation from power sources and to cover some large power fluctuations. The hybrid energy storage system with the proposed power sharing method can be flexibly adapted to various applications, such as hybrid electric vehicles, renewable energy systems and micro grids, to save or provide peak or transient power.

#### REFERENCES

- [1]. Yu Zhang\* and Zhen Hue Jiang (2012) 'Control and small-signal analysis of battery and super capacitor hybrid energy storage systems' IEEE Transactions on Industry Applications, Vol. 43, N. 3, pp.769–776.
- [2]. Abbey, C. and Joes, G. (2007) 'Super capacitor energy storage for wind energy applications', *IEEE Transactions on Industry Applications*, Vol. 43, No. 3, pp.769–776.
- [3]. Duryea, S., Islam, S. and Lawrence, W. (2001) 'A battery management system for stand-alone photovoltaic energy systems', IEEE Industry Applications Magazine, Vol. 7, No. 3, pp.67–72.
- [4]. Earl, H., Kolar, J.W. and Zach, F.C. (2002) 'A novel multicellular DC-AC converter for applications in renewable energy systems', IEEE Transactions on Industrial Electronics, Vol. 49, No. 5, pp.1048–1057.
- [5]. GAO, L., Douglas, R.A. and Liu, S. (2003) 'Active power sharing in hybrid battery/capacitor power sources', IEEE Applied Power Electronics Conference and Exposition, Vol. 1, pp.497–503.
- [6]. Gao, L., Black welder, M.J. and Douglas, R.A. (2004) 'Design and experimental tests of control strategies for active hybrid fuel cell/battery power sources', Journal of Power Sources, Vol. 130, Nos. 1–2, pp.163–171.
- [7]. Kassel, G.K. and Singh, B. (2008) 'Split capacitor VSC-based voltage and frequency controller for a stand-alone wind power generation', Int. J. of Power Electronics, Vol. 1, No. 2, pp.117–130.
- [8]. Lemofouet, S. and Refer, A. (2006) 'A hybrid energy storage system based on compressed air and super capacitors with maximum efficiency point tracking (MEPT)', IEEE Transactions on Industrial Electronics, Vol. 53, No. 4, pp.1105–1115.
- [9]. Linen, D., Buller, S., Karen, E. and De Dockers, R.W. (2003) 'Analysis and evaluation of charge balancing circuits on performance, reliability and lifetime of super capacitor systems', Industry Applications Conference, Vol. 3, pp.1589–1595.