



SOLAR INVERTER WITH A BATTERY FOR MICRO GRID APPLICATIONS

K.SUDHARSHAN REDDY¹, V.SAI CHARAN KUMAR²

¹Assistant Professor, Dept. of EEE, Sri Venkatesa Perumal College of Engineering And Technology, Puttur, Andhra Pradesh

²PG Student, Dept. of EEE, Sri Venkatesa Perumal College of Engineering And Technology, Puttur, Andhra Pradesh

International Journal
of Engineering
Research-online
(IJOER)

ISSN:2321-7758
www.ijoe.in

ABSTRACT

There is a strong number to build the state of being strong and active security which means having guaranteed crosswise over to dependable supplies of energy and the capacity to secure and convey adequate vitality to address operational issues. The point of this undertaking is to build up a sunlight based photovoltaic era framework with a battery for smaller scale lattice applications. Here, a hybrid nearby planetary group is utilized with lithium - particle battery for data power era. The proposed framework is proficient to give security of supply by giving continuous energy to discriminating loads and move reliably. We have utilized hysteresis control method for the inverter to produce beats. In the proposed small scale matrix framework, reproduction results are introduced and broke down.

Keywords: PhotoVoltaic (PV) Generation System, DC - DC Converter, Inverter, Isolated Transformer, Battery.

©KY PUBLICATIONS

1. INTRODUCTION

solar powered PV and vitality stockpiling have been widely utilized for standalone operation of pumps, telecommunication frameworks and houses in remote regions. Regularly vitality stockpiling components utilized as a part of those applications are lead corrosive batteries. Network - tie PV inverters are batteries have used to smooth force infused to the network. As of late framework - tie battery vitality storage utilizing Lithium - particle have been shown for single stage frameworks.

The point of this paper is to advancement of 80KW sunlight based photovoltaic small scale source with lithium - particle battery. The proposed framework as contradict to the ones reported in the writing has the capacity work in standalone and network joined mode and flawlessly transition from

network joined with matrix separated method of operation. The usage is in view of a standard force gadgets cell idea for miniaturized scale network applications. Figure demonstrates the association graph of the framework.

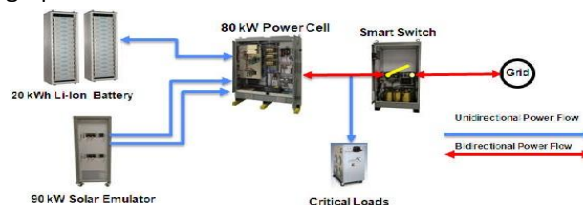


Fig 1 standalone and grid connected PV micro-source

Utilizing these setup discriminating burdens will be controlled either from the lattice or the half and half inverter. Likewise if the network conditions are not up to the force quality models needed by the heap it is conceivable to make an intentional is

landing until the lattice conditions come back to typical. The most dire outcome imaginable is a sudden loss of the lattice power; for this situation the framework ought to consequently move to a standalone method of operation and keep supplying energy to the basic IoT promotions. These and other conceivable working conditions exhibit a test to the neighborhood controller that necessities to address all of them without human intercession or changing the control structure. The paper will display a description of the framework and different components and also reproduction and test results. The result of this work will give an answer that will help DoD to meet his aspiring clean vitality programs. United States reliance on fossil powers has been recognized as a noteworthy issue that is inconveniently influencing its financial development and risking its national security. Additionally this reliance is putting US to vie for conventional fossil powers with the rising economies. The Department of Resistance (DoD) devours around 60 percent of all energy utilized government offices. To address this issue the government through the Department of Energy (DoE) and Department of Resistance (DoD).

2. CIRCUIT TOPOLOGY

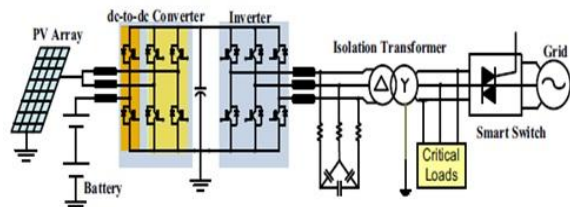


Fig 2 shows system interconnected diagram

The proposed interconnected block diagram fig 2 It comprises of PV cluster a battery as inputs. This is associated with the Dc - Dc converter which will help the voltage and afterward it is associated with inverter by means of dc connection capacitor. The channels are utilized to decrease the swell substance. A Smart switch is utilized to trip the circuit if there should be an occurrence of over voltages. Figure 2. Piece outline of framework interconnected graph.

A. DC - DC converters: The DC - DC converter is an electronic circuit which changes over a wellspring of direct current (DC) from one voltage level to another voltage level furthermore it is a class of force converter. DC-DC converters are critical in compact

electronic gadgets, for example, PDAs and tablets furthermore PCs which are supplied force from batteries. At that point such electronic gadgets regularly contain a few sub - circuits with every sub - circuit obliging an interesting voltage level unique in relation to that supplied by the battery change strategies.

B. Bidirectional converter:

The bi - directional converter along with vitality stockpiling has turned into a promising choice for some force related framework, including half breed vehicle, power module, renewable vitality framework et cetera. It is not just reduces the expense what's more, enhances effectiveness, additionally enhances the execution of the system.

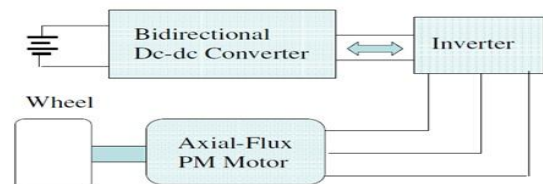


Figure 3 Bidirectional DC-DC converters in energy regenerative system

3. Operational of proposed converter

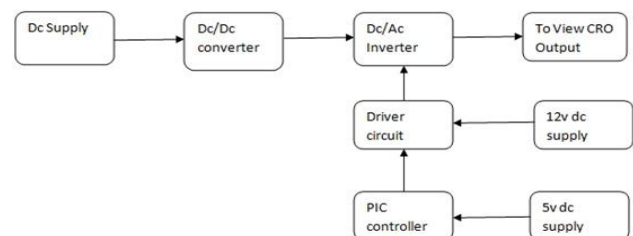


Fig 4 shows system interconnected diagram

Fig 4 shows framework interconnected outline The above fig4 demonstrates the association of the circuit voltage of 360V with a most extreme voltage of 420V and a base voltage of 315V. This battery will have the capacity to give up to 40KW of force for 60 minutes. The power molding unit is a 80KW standard cell at the DC side every leg has the capacity prepare 40KW at the very least info voltage of 300V. Two legs are arranged as unidirectional interleaved support converter to interface the PV exhibit and one leg is designed as a bidirectional dc-dc converter to interface the battery.

A . HYSTERESIS CONTROL : Among different PWM strategies, the hysteresis band current control is utilized all the time due to its straightforwardness of execution furthermore other than quick reaction

current circle and the strategy does not require any knowledge of burden parameters and however the present control with a settled hysteresis band has the burden that the PWM recurrence different with in a band in light of the fact that top - to -crest current swell is obliged to be controlled at all purposes of the principal recurrence wave. Then the system for versatile Hysteresis - band current control PWM system where the band can be customized as a component of burden to upgrade the PWM execution is depicted.

The essential usage of Hysteresis current control is in view of determining the switching signs from the examination of the present slip with a settled resilience band. At that point this control is in view of the correlation of the current lapse with a settled resistance band around the reference current connected with that stage. Then again, this sort of band control is adversely influenced by the stage current communications which is run of the mill in three - stage framework. This is fundamentally because of the interfaces between the replacements of the three stages and since every stage current not just relies on upon the comparing stage voltage but at the same time is influenced by the voltage of the other two stages. Depending on the heap conditions exchanging recurrence may differ amid the basic period and bringing about sporadic inverter operation. To minimize the impact of interferences between stages while keeping up the upsides of the Hysteresis systems by utilizing stage - bolted circle (PLL) method to oblige the inverter exchanging at a settled foreordained recurrence. In this venture, the present control of PWM - VSI has been actualized in the stationary (α, β) reference outlines.

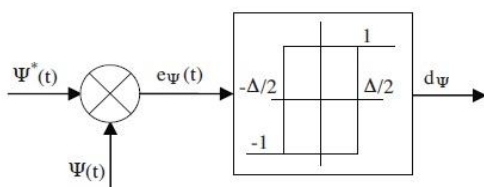


Figure 5 Two Level Hysteresis Band Control
 A two level Hysteresis comparator is utilized to look at the genuine estimation of stator flux to the inner reference esteem created by stator flux reference control.

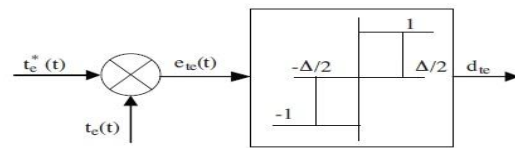


Figure 6 Three Level Hysteresis Band Control
 It is utilized to analyze the genuine estimation of the torque to the inner reference quality created by the rate torque reference controller. The yields of these comparators overhaul each examining time and they show whether the flux or torque must be varied. There are two Hysteresis current control systems 1. Square Hysteresis based control, 2. Hexagon Hysteresis based control both controllers work with current segments spoke to in stationary (α, β) coordinate framework. In this venture we are utilizing Hexagon Hysteresis based control.

4. SIMULATION RESULTS

In the simulation results we are giving sun powered and battery as inputs. This DC voltage is given to the bidirectional DC - DC help converter and this is associated with 3 stage inverter through a DC join capacitor indicated in the figure. For the DC - DC help converter the first leg heartbeats are given by a shut circle arrangement by PI controller. The other 2 leg heartbeats are given by typical PWM method. The exchanging system which we are utilizing here is HYSTERISIS CURRENT CONTROL. By utilizing this strategy the beats are given to the inverter. At that point the yield of the inverter is joined with channels which will lessen the swell substance. At long last we will get 3 stage AC voltages at the output.

The 7 shows for the outline of the framework vital framework level targets for the operation of the framework needs to characterize.

The present distinction is ought to be move back towards the center of the hysteresis hexagon as gradually as could reasonably be expected to accomplish a low exchanging recurrence. Furthermore, the tip of the present lapse i.e. is outside of the hexagon it ought to be returned in hexagon as fast as could reasonably be expected the operation indicated in above fig 8.

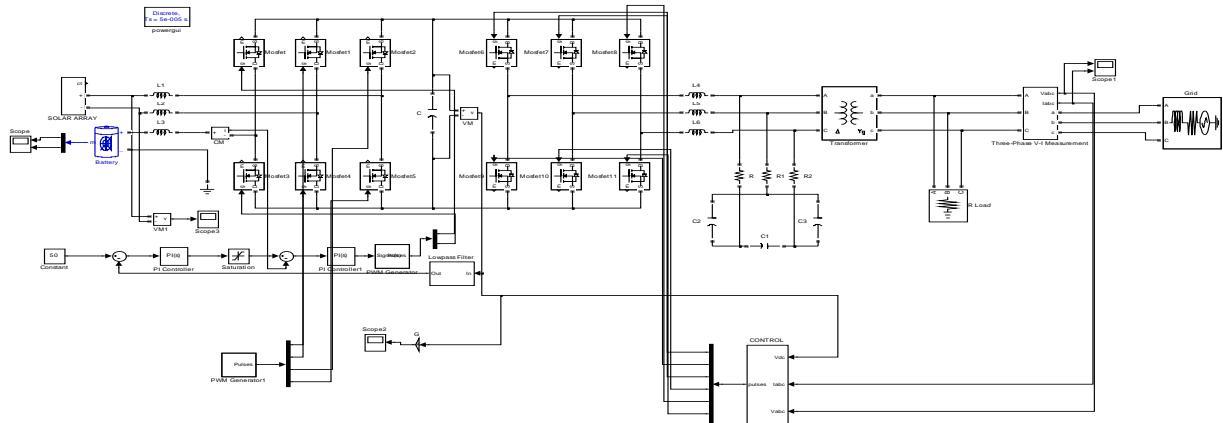


Figure 7 Simulink diagram

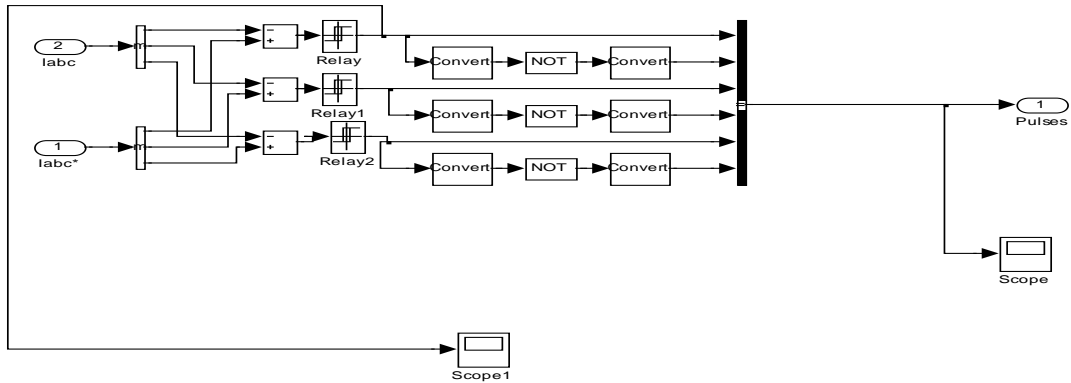


Figure 8 Hysteresis control logic block

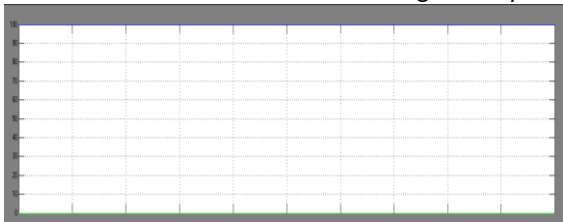


Figure: 9 PV voltages [V (vs) T]
 The above fig 9 shows the input voltage at dc side of the solar pv array is 100V

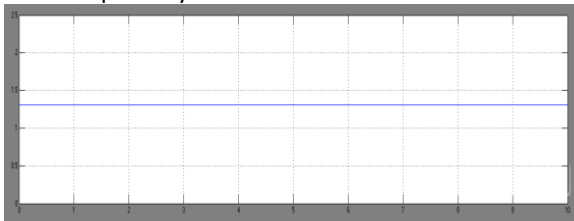


Figure 10 battery voltages [V (vs) T]
 The above figure 10 shows the input of the battery. The voltage is setting at 100V and battery current is 1.25A

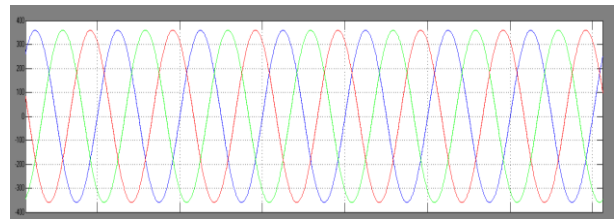


Figure 11 output voltages [V (vs) T]
 The above figure 11 shows the operation of output voltages getting 380v in output side in three-phase. In single phase the input voltage is 100V and output side the voltage is 380V

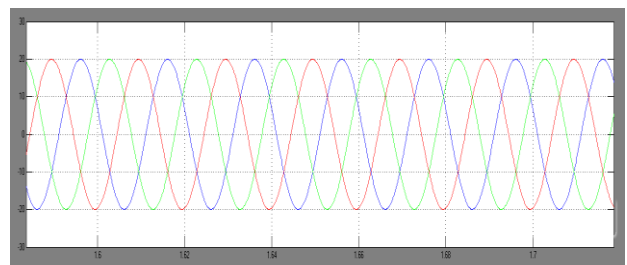


Figure 12 output current [V (vs) T]

The above figure 12 shows the out current in three phase system is 20A. The input side is 1.25A and outside of the three phases is 100A.

5. CONCLUSION

In this project, the solar based board and lithium particle battery is utilized as inputs for the force era. The idea of Hysteresis band current control is presented here to produce beats for the inverter. This system does not require any learning of burden parameters. On account of the numerous preferences that lithium particle battery offers compared to the next battery advancements, it is an exceptionally encouraging innovation that can be effectively used to relieve the impact of variability of the era and burden request. Besides, the proposed incorporation of the DC - DC converters and the control plans exhibit the ability of steady and quick element operation under various modes operation of PV exhibit furthermore, the Battery. The product instrument utilized as a part of this venture is MATLAB 2012.

REFERENCES

- [1]. Luis arnedo, albert kaeber, Hybrid solar inverter based on a standard power electronic cell for micro grids applications. IEEE on power electronics 2011.
- [2]. Wakao S, Ando R, Minami H, et al. Performance analysis of the PV/wind/wave hybrid power generation system. Proceedings of the 3rd World Conference on Photovoltaic Energy Conversion, May 18-18, 2003, Osaka, Japan: 2337-2340.
- [3]. Kjaer SB, Pedersen JK, Blaabjerg F. A review of single-phasegrid-connected inverters for photovoltaic modules. IEEE Transactions on Industry Applications 2005; 41(5): 1292-1306.
- [4]. Shao R, Kaye M, Chang L. Advanced building blocks of power converters for renewable energy based distributed generators. Proceedings of the 8th International Conference on Power Electronics and ECCE Asia (ICPE & ECCE), May 30-June 3, 2011, Jeju, Korea: 2168-2174.
- [5]. kazmierkowski MP. Current control techniques for three phase voltage source pwm converters: A survey. IEEE trans industrial electronics 1998;45(5):691-703.