International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 2, Issue 2, pp 25-28, April-2018

Design and Implementation Of Interleaved DC to DC Boost Converter Using Hysteresis Control

[1]S.Sowndharya, [2]V.Thirumurugan

[1]M.E Scholar, The Kavery Engineering College, Mecheri, Tamilnadu, India

[2]Assistant Professor, The Kavery Engineering College, Mecheri, Tamilnadu, India

Abstract - This project describes the development of hybrid system (solar, wind) with highly reliable and efficient converter equipped with advanced control strategies. The control strategies make the hybrid system compatible for higher power ratings. Hybrid system is directed towards the load to generate electrical energy which is connected to a interleaved boost converter. These boost converter characteristics are controlled by using two techniques, namely hysteresis control and MPPT (Maximum Power Point Tracking) control to maintain constant output. With soaring prices of fossil fuels and intensifying concerns about climate change, renewable energy systems are gaining importance. Out of all renewable energy systems, solar and wind power generation is gaining momentum because of its simple, non-moving and cost effective features. The main objective of this project is to extract maximum possible energy from the Photovoltaic modules by using optimization techniques and to use it for home applications. Possibility of power generation using natural resources also reduces the cost of power systems and in some cases accounts for carbon credits and CDM (Clean Development Mechanism). Multiphase boost converters are used to control the voltages from solar modules. Interleaved boost converter is connected with hybrid system output which increases the voltage equivalent to the battery charging voltage. With the developed system we could achieve a wide range of output voltages by simply setting the reference voltage. The MPPT control used is of P&O (Perturb and Observe) type, i.e., it traces the maximum possible power by a simple algorithm involving voltage and power.

Keywords: DC to DC Boost Converter, Hysteresis Control, Hybrid System, MPPT, Solar, Wind, Renewable Energy Systems.

I. INTRODUCTION

Generally in hybrid system (wind, solar) two main problems occur, that is power generation varies with weather condition and its low conversion efficiency. A DC to DC high step up converter is very essential to overcome the inherent low voltage characteristic. These converters were widely used in many applications such as automobile head lamps as a high–intensity discharge lamp, Uninterruptible Power System (UPS) and also for the communication power system [1]. Conventional converter has been used to provide high step up gain, but it has a drawback of high voltage stress on the switches, which makes high performance low voltage devices unsuitable. If the duty ratio approaches unity, the overall efficiency gets degraded, so the conventional converters like boost and buck-boost converters can't satisfy the application needs [2]. To produce high step up voltage gain many topologies have been presented with a minimum duty ratio. With simple structure DC-DC fly back converter generates a high voltage gain. Due to leakage inductance of transformer there is a high voltage stress on the active switches, and the voltage stress on the active switches can be clamped using few Energy-Regeneration techniques.

By increasing the turns of the transformer, the existing isolated voltage-type converter like phase-shifted full-bridge converter, able to produce high step-up gain, but more electrolytic capacitors are essential to reduce the input current ripples [3], [4]. Other isolated converters like active-clamp dual boost and active-clamp full bridge boost converter can achieve high efficiency and high step up conversion. To improve conversion efficiency switched capacitor based converter was proposed to achieve a large voltage conversion ratio [5].

International Research Journal of Innovations in Engineering and Technology (IRJIET)
ISSN (online): 2581-3048
Volume 2, Issue 2, pp 25-28, April-2018

II. PROPOSED SYSTEM

An atmospheric conditions (mainly dependent on temperature and insulation level), wind and solar PV cells supply maximum power at a particular operating point the maximum power point (MPPT). Unlike conventional (fueled) power sources, it is desirable to operate hybrid systems at their MPPT [9]. However, the MPP locus varies over a wide range, depending on a PV array's temperature and isolation intensity. Instantaneous shading conditions and ageing of PV cells also affect the MPP locus.

The problem is further complicated should the load's electrical characteristics also vary. Hence, in order to achieve operation at the MPP, a time varying matching network which interfaces the varying source and the potentially varying load is required [6]-[8]. The role of this matching network, called the maximum power point tracking network (MPPT), is to ensure operation of the PV generator (PVG) at its MPP, in the face of changing atmospheric conditions and load variations.

Block Diagram of Proposed System

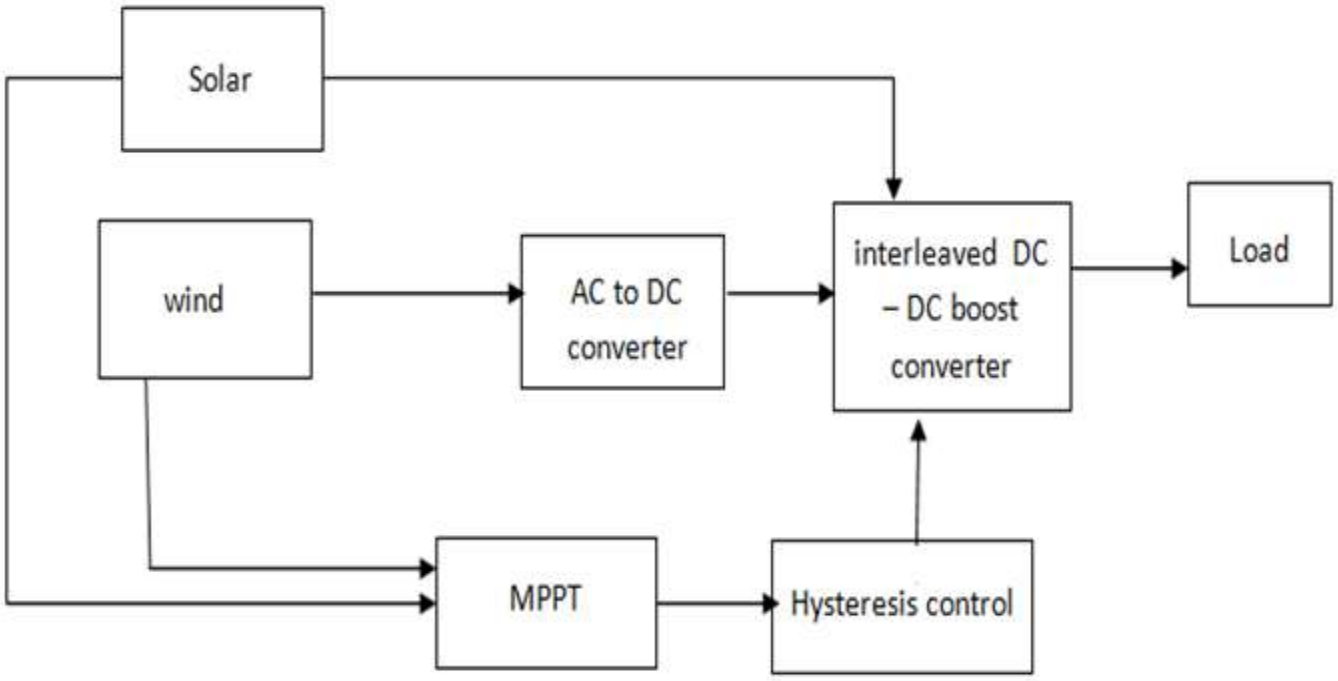

Figure-1: Block Diagram of Proposed System

III. RESULT AND DISCUSSION

The performances of the proposed converter with MPPT controller for PV system are discussed in this section. This proposed converter along with the MPPT controller can achieve maximum efficiency of more than 96% as shown in Figure. From the PV array we can obtain maximum power using MPPT controller. This MPPT controller can effectively track the maximum power point from the PV array. Our proposed converter with an MPPT controller can generate 2.4 times of more PV power when compared with the converter without using MPPT algorithm. The result shows that our proposed converter with MPPT controller is proven to be effective and can generate maximum power from the PV system.

International Research Journal of Innovations in Engineering and Technology (IRJIET)
ISSN (online): 2581-3048
Volume 2, Issue 2, pp 25-28, April-2018

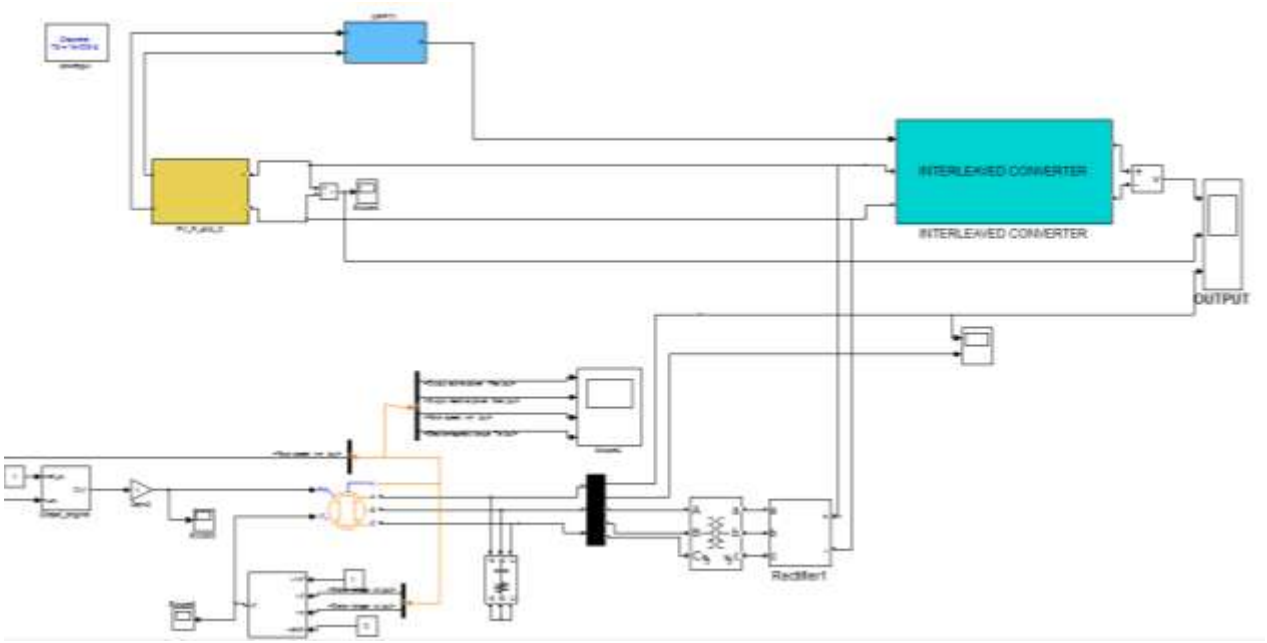

Figure-2: Simulation Circuit of Proposed System

While comparing with other conventional converter, our proposed converter along with MPPT controller provides better conversion efficiency. The proposed converter is validated by using the rating of 400W, 25V input and 400V output. The result shows that for high step up voltage gain applications, this method proven to be very effective.

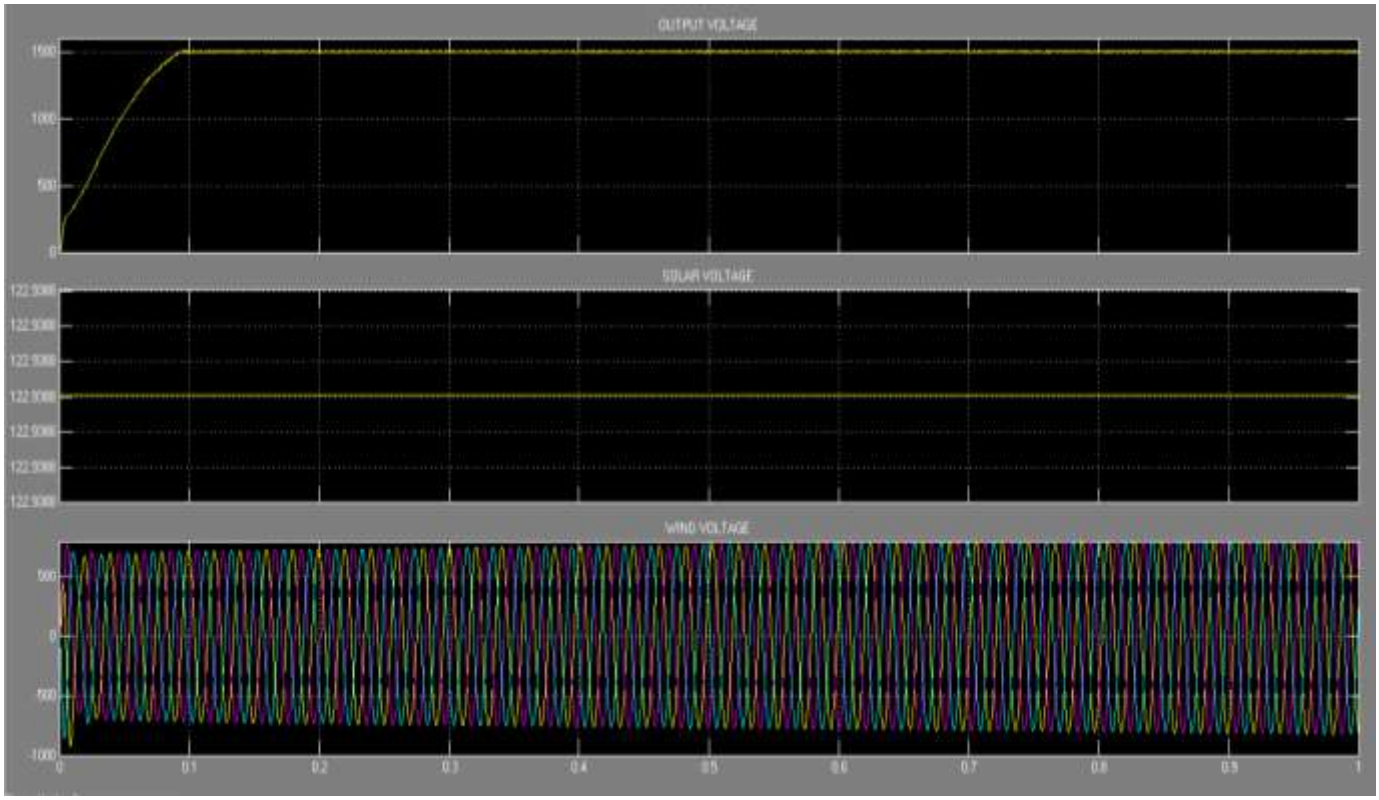

Figure-3: Simulation Overall Output

ISSN (online): 2581-3048
Volume 2, Issue 2, pp 25-28, April-2018

Applications

- This project is used in offices, homes, industries etc…
- Especially This project is very useful to the In the rural Areas. Because in rural areas frequently load state will be happen.

Advantages

- Low Cost
- High Efficiency
- Easy To Implementation

IV. CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place. Atmel microcontroller is found to be less complex, more compact design size and user friendly. This can readily be used in order to perform. This embedded system is used to design kept in mind about the need for industries it also can be extended for other purposes like research and commercial applications. Due to the invention of high level technology used fully software controlled with less hardware circuit. This system makes to base for future systems. The principle of the research and development of science technology is that "nothing is impossible". So we shall look forward to a bright & sophisticated world.

REFERENCES

[1] Q. Zhao, F. C. Lee, *IEEE Trans. Power Electron*, 18, 65 (2003).
[2] Q. Li, P. Wolfs, *IEEE Trans. Power Electron*, 23, 1320 (2008).
[3] L. S. Yang, et al., *IEEE Trans. on Industrial Electronics*, 56, 3144 (2009).
[4] Fardoun(Garden), E. H. Ismail, *IEEE Trans. on Industrial Applications*, 46, 2025 (2010).
[5] J. A. R. Hernanz, et al., *International Conference on Renewable Energies and Power Quality (ICREPQ '10),* 2010, pp-1–5.
[6] T. Esramand,P. L.Chapman, *IEEE Transactions on Energy Conversion*,22,439(2007).
[7] Subiyanto,et al., *International Review of Electrical Engineering*, 52, 2535(2010).
[8] V. Salas, et al., *Solar Energy Materials & Solar Cells*, 90, 1555 (2006).
[9] Subiyanto, et al., *International Review of Electrical Engineering*, 5, 2535(2010).

How to cite this article:
S.Sowndharya, V.Thirumurugan, "Design and Implementation Of Interleaved DC to DC Boost Converter Using Hysteresis Control", in *International Research Journal of Innovations in Engineering and Technology (IRJIET)*, Volume 2, Issue 2, pp 25-28, April 2018.

****

