iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IV **Month of publication:** April 2023

DOI: https://doi.org/10.22214/ijraset.2023.50985

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

MPPT Based Solar String Inverter

Pranay Thakur[1], Nimesh Bhandari[2] , Vineet Paunikar[3], Dr. Devendra Holey[4]
Department of Electrical Engineering, K.D.K. College of Engineering, Nagpur

Abstract: In this paper, we present an MPPT The MPPT-based solar inverter we offer in this study assures that the solar array produces its maximum output. The circuit's functionality allows it to A Highly Efficient MPPT (Maximum Power Point Tracking) Solar Inverter is what this effort tries to build. The system is built with a boost converter to increase the power coming from the solar array.
Keywords: IGBT, MPPT controllers, LC filter, bush converter

I. INTRODUCTION

Energy is an important variable in the growth of all industries. India uses 5,000 trillion KWh of solar energy annually. This energy is limitless and pollution-free.

We created a powerful MPPT solar inverter. The goal of the solar power programme is to contribute to the advancement of renewable energy technology, the only reliable energy source for coming generations.

II. METHODS

PV strings are linked to separate inverters in this system through a string inverter. A converter (DC-to-DC) is able to be used to increase the power each string of lights supplies to the main inverter. Solar panels and the entire system are more efficient and reliable of the PV modules and the complete system. The response of the poor performance of a solar panel is limited to its string, thus the whole

A. MPPT

The amount of solar energy converted into electrical energy by a standard solar panel is only 30 to 40%. The MPPT used to increase the solar panel's effectiveness. The Thevenin Impedance of the circuit (source impedance) must equal the load impedance for the circuit to produce its maximum amount of power, according to the Maximum Power Transfer Theorem. As a result, our issue with monitoring the MPPT becomes an impedance matching issue. In order to increase the voltage at the output so that it may be utilised for various purposes, such as motor load, on the supply side, we are employing a buck converter coupled to a solar panel. We can match the operating cycle of the converter to the suitable appropriately The source impedance and load impedance can be matched

B. Converter

Operation of a Boost Converter as a Boost ConverterTr1 is continuously on when the high recurrence square wave is linked to Tr2 door in the Boost Converter mode.

The information current flows via the inductor L and directly through Tr2 during the on periods when Tr2 is leading, energising the attractive field around L as it does so. Tr2 is actively leading while this is going on, holding D2's anode at ground potential, preventing D2 from directing. Throughout the on phase previous oscillator cycles is fully supplying the load. The gradual release of C throughout the on time (and the ensuing energising) indicates a significant recurring swell on the yield voltage, which is at a capacity of around VS + VL.

L is charged as Tr2's off time approaches, and C is half-released. A back e.m.f is now produced by the inductor L. The back e.m.f can be any voltage throughout a large range, depending on the design of the circuit, because its value depends on the rate of progress of current as Tr2 switches and on the amount of inductance the loop possesses Accordingly, depending on how the circuit is designed, the back e.m.f. can be any voltage over a large range.

Notably, the voltage crosswise over L's extremities has now shifted, adding to the information voltage VS and producing a yield voltage that is at least equal to or stronger than the information voltage. Currently, D2 is forward-biased, so the circuit current supplies the load current and, in the meantime, recharges the capacitor to VS + VL in preparation for the upcoming on-time of Tr2, which is done by MOSFETs. do all the switching.

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

C. MATLAB Simulation

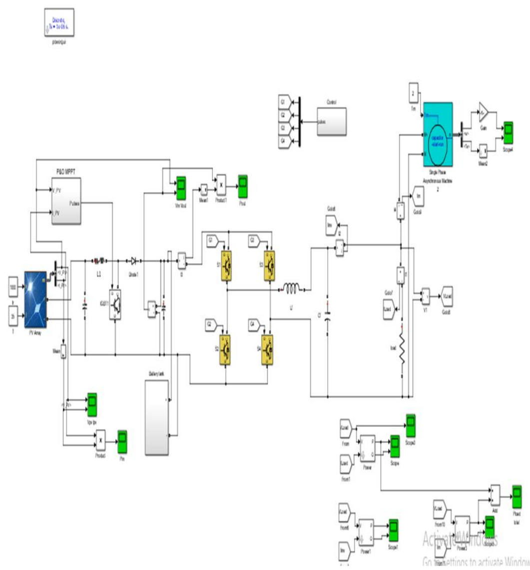

Fig. : Input voltage of PV panel and output voltage of booster converter

III. SIMULATION RESULTS

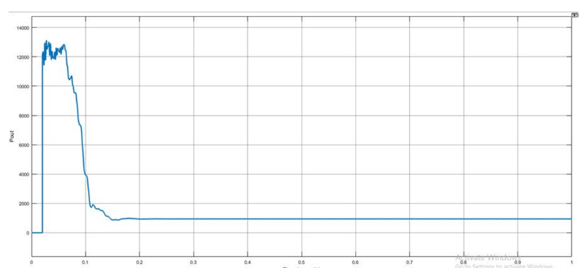

Fig. : Output power of booster converter.

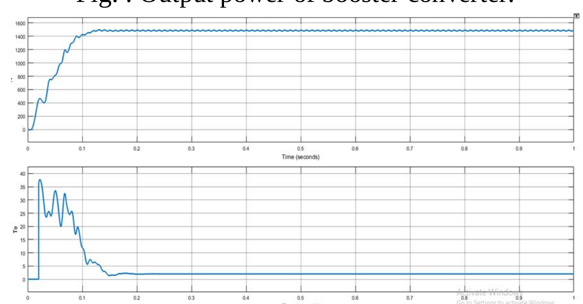

Fig. : Induction Motr characteristics

IV. CONCLUSION

A solar PV panel has been modelled and perturb and observe MPPT technique is developed for maximising its operating efficiency. Studies on the solar PV Simulink model shows the nonlinear I-V and P-V characteristics of the PV panel to different solar irradiance of 1000 W/m2, 800 W/m2, 600 W/m2 and cell temperature of 25°C, 50°C, 75°C. The PV output power decreases as the irradiance level decrease and when the working temperature of the PV cells rises. The P&O MPPT technique used for maximising the output power of the PV panel is able to effectively operate the system at a point very closed to maximum available power from the PV panel source. The percentage deviation of the PV output power from the ideal PV power is about 10% for the tested operating condition of solar irradiance and cell temperature.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

REFERENCES

[1] Ram, J.P., Babu, T.S., Rajasekar, N.: 'A comprehensive review on solar PV maximum power point tracking techniques', Renew. Sustain. Energy Rev., 2017, 67, pp. 826–847
[2] Kumar, D., Chatterjee, K.: 'A review of conventional and advanced MPPT algorithms for wind energy systems', Renew. Sustain. Energy Rev., 2016, 55, pp. 957–970
[3] (September 1999) 2. N. S. D'Souza, L. A. Lopes and X. Liu, Concordia University Department of Electrical and Computer Engineering, IEEE, (2005)
[4] M. Alata, M..A. Al-Nimr, Y. Qaroush, Energy Conversion and Management, 46 (2005) 1229– 1245
[5] W. Batayneh, A. Owais, M. Nairoukh, Elsevier, Automation in Construction 29 (2013) 100–106
[6] Advanced Algorithm for control of Photovoltaic systems - C. Liu, B. Wu and R. Cheung
[7] A new Analog MPPT Technique: TEODI - N. Femia, G. Petrone, G. Spagnuolo, M. Vitelli