International Journal of Research
Available at https://edupediapublications.org/journals
e-ISSN: 2348-6848
p-ISSN: 2348-795X
Volume 05 Issue 12
April 2018

Solar Buck Boost Convertor by Using Mppt Method

Dr. M.Selvaraj , Ravikumar.V, Sabarisan.M, Sambath Kumar.K, and Saravanan.V,

ABSTRACT

Especially alternative source of energy is vital for the development of a country. In future the world anticipates to develop more of its solar resource potential as an alternative energy source to overcome the persistent shortages and unreliability of power supply. In order to maximize the power output the system components of the photovoltaic system should be optimized. For the optimization maximum power point tracking (MPPT) is a promising technique that grid tie inverters, solar battery chargers and similar devices use to get the maximum possible power from one or more solar panels. Among the different methods used to track the maximum power point.

Key Words : Solar, MPPT, Buck boost convertor

1. Introduction

SOLAR POWER

Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect. Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by an off-grid rooftop PV system. Commercial concentrated solar power plants were first developed in the 1980s. The 392 MW Ivanpah installation is the largest concentrating solar power plant in the world, located in the Mojave Desert of California. As the cost of solar electricity has fallen, the number of grid-connected solar PV systems has grown into the millions and utility-scale solar power stations with hundreds of megawatts are being built. Solar PV is rapidly becoming an inexpensive, low-carbon technology to harness renewable energy from the Sun. The current largest photovoltaic power station in the world is the 850 MW Longyangxia Dam Solar Park, in Qinghai, China. The International Energy Agency projected in 2014 that under its "high renewables" scenario, by 2050, solar photovoltaics and concentrated solar power would contribute about 16 and 11 percent, respectively, of the worldwide electricity consumption, and solar would be the world's largest source of electricity. Most solar installations would be in China and India. As of 2016, solar power provided just 1% of total worldwide electricity production but was growing at 33% per annum.

Concentrated solar power

A parabolic collector concentrates sunlight onto a tube in its focal point.Concentrated solar power (CSP), also called "concentrated solar thermal", uses lenses or mirrors and tracking systems to concentrate sunlight, then use the resulting heat to generate electricity from conventional steam-driven turbines.A wide range of concentrating technologies exists: among the best known are the parabolic trough, the compact linear Fresnel reflector, the Stirling dish and the solar power tower. Various techniques are used to track the sun and focus light. In all of these systems a working fluid is heated by the concentrated sunlight, and is then used for power generation or energy storage.

2. MAXIMUM POWER POINT TRACKING

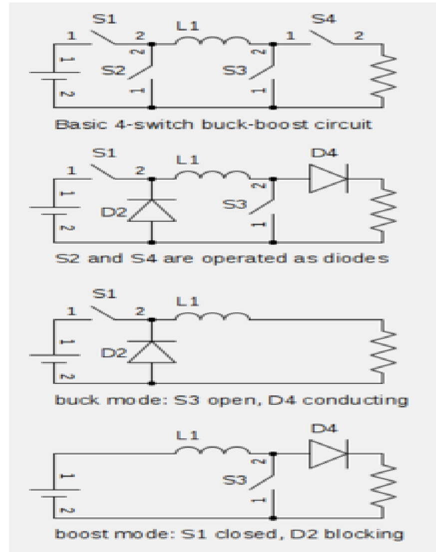
This paper reviews state of the art maximum power point tracking (MPPT) algorithms for solar energy systems. Due to the instantaneous changing nature of the power, it is desirable to determine the one optimal generator speed that ensures maximum energy yield. Therefore, it is essential to include a controller that can track the maximum peak regardless of wind speed. The available MPPT algorithms can be classified as either with or without sensors, as well as according to the techniques used to locate the maximum peak. A comparison has been made between the performance of different MPPT algorithms on the basis of various speed responses and ability to achieve the maximum energy yield. Based on simulation results available in the literature, the optimal torque control (OTC) has been found to be the best MPPT method for solar energy systems due to its simplicity. On the other hand, the perturbation and observation (P&O) method is flexible and simple in implementation, but is less efficient and has difficulties determining the optimum step-size.

3. BUCK BOOST CONVERTOR

A buck-boost converter includes: a buck converter section including a first switch, a first rectifier, and an inductor; a boost converter section sharing the inductor and including a second switch, a second rectifier, and a smoothing circuit; and a control circuit for generating and outputting a first driving signal for opening and closing the first switch and a second driving signal for opening and closing the second switch. The control circuit includes: an error amplifier circuit for amplifying an error between an output value from the smoothing circuit and a predetermined voltage value to thereby generate and output an error signal; an oscillator circuit for generating and outputting a triangular wave signal having a predetermined cycle; a compensatory signal generation circuit for generating and outputting a compensatory signal, which oscillates in a cycle that is at least twice the cycle of the triangular wave signal; a control signal generation circuit for adding together the error signal and the compensatory signal to thereby generate and output a control signal; and a comparator circuit for comparing the triangular wave signal with the control signal to generate and output the first or second driving signal.

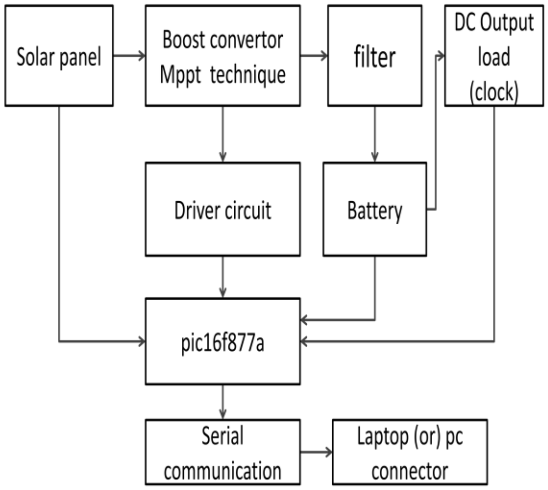
A buck (step-down) converter combined with a boost (step-up) converter

The output voltage is typically of the same polarity of the input, and can be lower or higher than the input. Such a non-inverting buck-boost converter may use a single inductor which is used for both the buck inductor mode and the boost inductor mode, using switches instead of diodes,</ref> "Analysis, control and design of a non-inverting buck boost converter: A bump-less two-level T–S fuzzy PI control" ISA transactions.



4. WORKING PRINCIPLE

Especially alternative source of energy is vital for the development of a country. In future the world anticipates to develop more of its solar resource potential as an alternative energy source to overcome the persistent shortages and unreliability of power supply. In order to maximize the power output the system components of the photovoltaic system should be optimized. For the optimization maximum power point tracking (MPPT) is a promising technique that grid tie inverters, solar battery chargers and similar devices use to get the maximum possible power from one or more solar panels. Among the different methods used to track the maximum power point The buck–boost converter is a type of DC-to-DC converter that has an output voltage magnitude that is either greater than or less than the input voltage magnitude. It is equivalent to a fly back converter using a single inductor instead of a transformer. Two different topologies are called *buck–boost converter*. Both of them can produce a range of output voltages, ranging from much larger (in absolute magnitude) than the input voltage, down to almost zero.



Block diagram

Advantages

1. RCC has the advantage of not introducing any external disturbance into the system, but makes use of the current or voltage ripple already present in the system.
2. The method converges asymptotically at maximum speed to the MPP without the benefit of any module parameters or measurement.
3. The IncCond method has the advantage over the P&O of not oscillating around the MPP under rapidly changing environmental conditions, but has a more complex circuitry.

Applications

1. Successful application of these sustainable sources depends on being able to maximize efficiency in both conversion and energy storage.
2. Solar insulation
3. Cell temperature

5. Conclusion

This project is made with preplanning that it provides flexibility in operation. This innovation has made the more desirable and economical. This project "Solar buck boost convertor by using MPPT method" is designed with the hope that it is very much economical and help. This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.

Reference

1. S. Michele, R. Saidur, and A. Safari, "A review on solar energy use in industries," Renewable Sustainable Energy Rev.
15, 1777–1790 (2011).
2. W. Rong-Jong, W. Wen-Hung, and L. Chung-You, "High-performance stand-alone photovoltaic generation system,"
IEEE Trans. Ind. Electron. 55, 240–250 (2008).
3. S. Mekhilef, A. Safari, W. E. S. Mustaffa, R. Saidur, R. Omar, and M. A. A. Younis, "Solar energy in Malaysia: Current
state and prospects," Renewable Sustainable Energy Rev. 16(1), 386–396 (2012).
4. W. Liu and Y. Bao, "Research of maximum power point tracking for photovoltaic with buck chopper," in 3rd
International Workshop on Intelligent Systems and Applications (ISA) (IEEE Conference Publications, 2011), pp. 1–4.
5.See
http://www.blueskyenergyinc.com/uploads/pdf/BSE_What_is_MPPT.pdf for the description on the concept of
Maximum Power Point Tracking (MPPT).
6. X. Weidong, A. Elnosh, V. Khadkikar, and H. Zeineldin, "Overview of maximum power point tracking technologies for
photovoltaic power systems," in IECON 2011—37th Annual Conference on IEEE Industrial Electronics Society (IEEE
Conference Publications, 2011), pp. 3900–3905.
7. K. Ishaque, Z. Salam, M. Amjad, and S. Mekhilef, "An improved particle swarm optimization (PSO) based MPPT for PV
with reduced steady state oscillation," IEEE Trans. Power Electron. 27(8), 3627–3638 (2012).
8. A. Safari and S. Mekhilef, "Implementation of incremental conductance method with direct control," in 2011 IEEE
Region 10 Conference (IEEE Conference Publications, 2011), pp. 944–948.
9. T. Esram and P. L. Chapman, "Comparison of photovoltaic array maximum power point tracking techniques," IEEE
Trans. Energy Convers. 22, 439–449 (2007).
10. M. A. G. de Brito, L. P. Sampaio, G. Luigi, G. A. e Melo, and C. A. Canesin, "Comparative analysis of MPPT techniques

for PV applications," in International Conference on Clean Electrical Power (ICCEP) (IEEE Conference Publications,
2011), pp. 99–104.
11. I. Purnama, L. Yu-Kang, and C. Huang-Jen, "A fuzzy control maximum power point tracking photovoltaic system," in
IEEE International Conference on Fuzzy Systems (FUZZ) (IEEE Conference Publications, 2011), pp. 2432–2439.
12. T. Mrabti, M. El Ouariachi, B. Tidhaf, K. Kassmi, and E. Chadli, "Regulation of electric power of photovoltaic generators
with DC-DC converter (buck type) and MPPT command," in International Conference on Multimedia Computing
and Systems (IEEE Conference Publications, 2009), pp. 322–326.
13. A. Thenkani and N. Senthil Kumar, "Design of optimum maximum power point tracking algorithm for solar panel," in
International Conference on Computer, Communication and Electrical Technology (ICCCET) (IEEE Conference
Publications, 2011), pp. 370–375.
14. R. F. Coelho, F. Concer, and D. C. Martins, "A study of the basic DC-DC converters applied in maximum power point
tracking," in Power Electronics Conference (IEEE Conference Publications, 2009), pp. 673–678.
15. S. Patel and W. Shireen, "Fast converging digital MPPT control for photovoltaic (PV) applications," in 2011 IEEE
Power and Energy Society General Meeting (IEEE Conference Publications, 2011), pp. 1–6.
16. T.-P. Lee, S.-T. Wu, J.-M. Wang, H.-J. Chiu, and Y.-K. Lo, "A modular PV charger with maximum power point tracking
and pulse-charging schemes," in 5th IET International Conference on Power Electronics, Machines and Drives (PEMD
2010) (IET Conference Publications, 2010), pp. 1–6.
17. C. Roshau, S. Yuvarajan, and D. Schulz, "Modeling and hardware implementation of VMPPT for a PV panel with a reference
cell," in 34th IEEE Photovoltaic Specialists Conference (PVSC) (IEEE Conference Publications, 2009), pp.
001034–001037.
18. See http://photovoltaics.sandia.gov/docs/PVFEffIntroduction.htm for the introduction on various types of PV system.
19. L. Fangrui, D. Shanxu, L. Fei, L. Bangyin, and K. Yong, "A variable step size INC MPPT method for PV systems," IEEE
Trans. Ind. Electron. 55, 2622–2628 (2008).
20. A. Kassem and M. Hamad, "A microcontroller-based multi-function solar tracking system," in IEEE International Systems Conference (SysCon) (IEEE Conference Publications, 2011), pp. 13–16.