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A REVIEW OF ANN BASED RENEWABLE ENERGY APPLICATION WITH DIFFERENT DC-DC CONVERTERS

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ABSTRACT

The review of Renewable Energy which are used in different DC to DC converter. Now days, a huge problem in many countries is the power storage system. This problem occurs because of the high load which is cannot be covered by the conventional energy power generation. In this paper different types of nonisolated DC to DC converters are presented which are Buck boost converter, and Cuk converter. This paper presents a brief literature review of the work carried out by the various researchers in this field.

KEYWORDS: Photovoltaic system, Boost converter, Buckt converter, Cuk converter, MPPT, ANN, etc.

1. INTRODUCTION

Renewable energy sources are considered as a technological option for significantly contributing to the sustainable energy supply. PV energy generates electricity from solar radiation and, at present, represents one of the renewable energy sources emerging technologies due to the continuous cost reduction and technological progress. In order to use solar electricity for practical devices, which require a particular voltage or current for their operation, a number of solar cells have to be connected together to form a solar panel, also called a photovoltaic (PV) module.

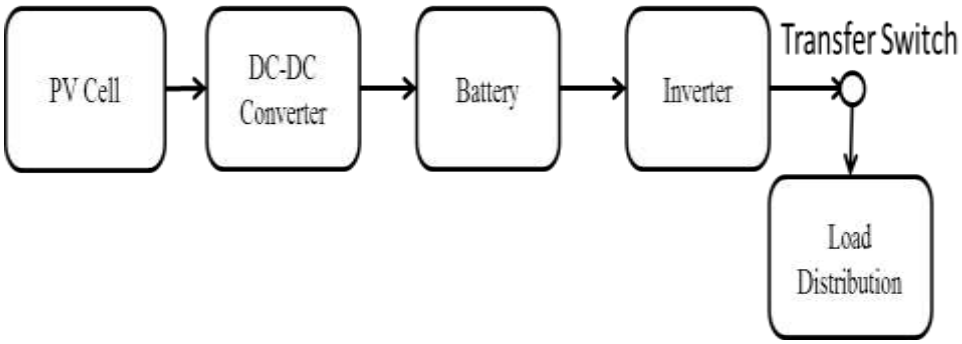

Fig. 1. Solar module

The solar panels are only a part of a complete PV solar system. Solar modules are the heart of the system and are usually called the power generators. One must have also mounting structures to which PV modules are fixed and directed towards the sun. For PV systems that have to operate at night or during the period of bad weather the storage of energy are required, the batteries for electricity storage are needed. The output of a PV module depends on sunlight intensity and cell temperature; therefore components that condition the DC (direct current) output and deliver it to batteries, grid, and/or load are required for a smooth operation of the PV system.

A simple solar cell consist of solid state p-n junction fabricated from a semiconductor material (usually silicon).In dark, the IV characteristic of a solar cell has an exponential characteristic similar to that of a diode. However when the solar energy (photons) hits on the solar cell, energy greater than the band gap energy of the

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semiconductor, and release electrons from the atoms in the semiconductor material, creating electron-hole pairs. The charged carrier is moved apart under the influence of internal electric fields of the p-n junction and hence a current proportional to the incident photon radiation is developed. When the cell is short circuited, this current flows in the external circuit but when open circuited, this current is shunted internally by the intrinsic p-n junction diode. They are using grid system for implementation.

Photovoltaic systems require interfacing power converters between the PV arrays and the grid. These power converters are used for two major tasks. First, is to inject a sinusoidal current in to the grid. And second is to reduce the harmonics content in the grid injected voltage and current. Normally there are two power converters. The first one is a DC/DC power converter that is used to operate the PV arrays at the maximum power point. The other one is a DC/AC power converter to interconnect the photovoltaic system to the grid.

Photovoltaic cell

A photovoltaic cell is the basic device that converts solar radiation into electricity which is made of semiconductor materials such as silicon. For solar cells, a thin semiconductor wafer is specially treated to form an electric field, positive on one side and negative on the other. When light energy strikes the solar cell, electrons are knocked loose from the atoms in the semiconductor material. If electrical conductors are attached to the positive and negative sides, forming an electrical circuit, the electrons can be captured in the form of an electric current that is, electricity. This electricity can then be used to power a load. A PV cell can either be circular or square in construction.

Photovoltaic array

The power that one module can produce is not sufficient to meet the requirements of home or business. Most PV arrays use an inverter to convert the DC power into alternating current that can power the motors, loads, lights etc. The modules in a PV array are usually first connected in series to obtain the desired voltages, the individual modules are then connected in parallel to allow the system to produce more current.

Photovoltaic module

Cells are arranged in a frame to form a module. The several PV cells are connected in series (for high voltage) and in parallel (for high current) to form a PV module for desired output. Separate diodes may be needed to avoid reverse currents in case of partial or total shading, and at night. The p-n junctions of mono-crystalline silicon cells may have adequate reverse current characteristics and these are not necessary.

2. DC-DC CONVERTERS

A boost converter is a dc to dc voltage converter with an output dc voltage greater than input dc voltage. This is an SMPS containing at least two semiconductors switches, diode which act as freewheeling diode two ensure a path of the current during the off state of other switch and a transistor connecting in series of the source voltage.

1. Buck converter

This is a converter whose output voltage is smaller than the input voltage and output current is larger than the input current.

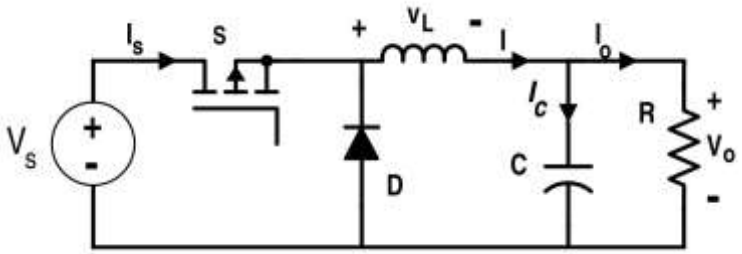

Fig. 2. Buck converter

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2. Boost converter

This is a converter whose output voltage is greater than the input voltage and output current is smaller than the input current.

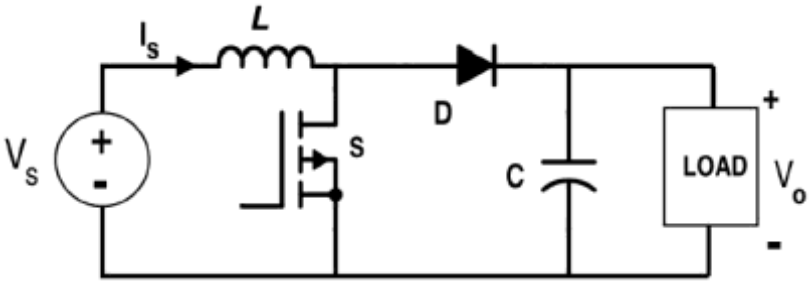

Fig. 3. Boost converter

3. Buck- boost converter

The buck–boost converter is a type of DC-DC converter that has an output voltage magnitude that is either greater than or less than the input voltage magnitude.

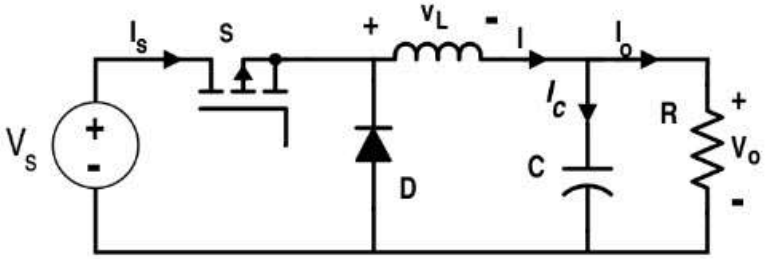

Fig. 4. Buck-Boost converter

3. RELATED WORK

Aluísio Alves de Melo Bento, et.al, this paper presents a two-input single switch dc-dc converter controlled by a single switch. The proposed converter performs independent energy flux control for each dc input while minimizing the number of switches and drivers. Maximum power point tracking technique is employed in order to confirm the performance of the proposed converter when applied to photovoltaic systems. The simulation results were acquired for open loop operation, which has been shown to be robust and simple thus confirming the feasibility of the proposed scheme **[1].**

Munish Manas, et.al, proposed artificial neural network based maximum power point tracking method for photovoltaic system using MATLAB simulink software. In this paper, a PV model has been used to simulate actual PV arrays behavior, and then a Maximum Power Point tracking method using Artificial Neural Network is proposed in order to control the on goings of the DC-DC Buck Boost Converter. Simulation results show that Artificial Neural Network is near accurate in predicting the Maximum Power Point **[2].**

N. Jiteurtragool, et.al, proposed a power control system in DC-DC Boost converter integrated with photovoltaic arrays using optimized back propagation artificial neural network by using MATLAB simulink software. The back propagation ANN controller is realized for regulating an output voltage. The simulation result shows the neural network controller possesses fast settling time of 6.4ms with low voltage ripples of approximately 0.625% **[3].**

B. S. Dhivya, proposed a Neural Network Controller for boost converter by using MATLAB simulink software. This controller is designed to stabilize the output voltage of the boost converter and to improve its performance during transient operations. The simulation result shows that the artificial neural network based controller proves to have a fast response in tracking the desired output voltage and is also effective ill decreasing overshoot, oscillations and settling time **[4].**

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Aarti Gupta, In any PV based system; the inverter is a critical component responsible for the control of electricity flow between the dc source, and loads or grid. This paper presents a solar PV generation system integrated to the grid. The results of matlab modeling of the system detail the comparative operation of inverter topologies which are the conventional two level inverters and multilevel inverter topology to reduce total harmonic distortions in grid voltage and electromagnetic interference. The proposed control scheme to mitigate the power quality issues for power quality improvement in grid integrated DER simulated using MATLAB/ SIMULINK in power system block set. The MLIs are very beneficial as the number of switches in inverter increases this increases the level of inverter the harmonics distortion in AC output voltage and current decreases, it also provide reactive power compensation to the AC grid and reduction in electromagnetic emissions because they operate on lower switching frequency **[5].**

4. CONCLUSION

The various papers and literature has been studied for ANN based Renewable energy. The DC to DC converter perform better in the renewable energy but required higher computation time. In feature, the solar energy based Artificial neural network controller with Buck- Bosst, Cuk, and SEPIC converter may be useful.

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