

**SIMULATION OF MAXIMUM POWER POINT TRACKING TECHNIQUE IN PV
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Assistant Professor, Department of Electrical Engineering, G.H.Raisoni University, Amravati²tbzvaibhav956@gmail.com¹, chetan.bobade@raisoni.net²**ABSTRACT**

In electrical power generation, photovoltaic (PV) is one of the best renewable energy source. In this technique we use solar energy to produce electrical energy. The main purpose of using solar energy nowadays is that the deposits of fossil fuels are decreasing day by day due to highly consumption of those fuels in most of the fields. So because of this we are facing energy crisis and solar energy is best option for this problem. So in the field of renewable energy source it is important to investigate this solar energy source and maximize its efficiency. This paper presents a literature survey from recent theories in maximum power point tracking control algorithms. Maximum power point trackers play a very important role in photovoltaic systems as they increases efficiency of the system. MPPT control is used to match the load resistance to the input resistance of the source to enhance the power delivered from the photovoltaic system. As we know there are differences of power obtained from the sun rays as the time changes from morning to evening. This shows as per timing variations in day the output obtained from photovoltaic system also changes. So it is important to track the time which can give maximum output.

Keywords--- MPPT, Photovoltaic System, Renewable Energy, Efficiency**I.INTRODUCTION**

Nowadays, scientists and engineers are doing major research on the clean, renewable, efficient and environmental friendly sources from which energy can be generated. Thus including all renewable energy sources, solar power system attracts more research because of their tremendous availability on the earth, so using PV system in wide ranges because of its reduced cost in manufacturing, it is suitable in electrical power generation. But the main problem is low efficiency of solar panels still exist. So it becomes important to work on its efficiency. The output of photovoltaic system is depends upon two variables that are cell temperatures and solar irradiances. And thus its efficiency goes upto 30 to 40%. It means the conversion of incident energy into electricity is done upto 40%. So that we use techniques to increase the efficiency of photovoltaic and those techniques are called as MPPT method .These techniques are helpful to obtained maximum available power from PV module by operating them at most efficient output.

So that to obtain maximum power point a technique is necessary to force the controller to operate at optimum operating point. In this field, many tracking control systems are available and implemented. There are number of techniques are developed and many more techniques are in development from which we can get more efficient output. By the way, there are different methods or algorithms such as artificial neural networks, fuzzy logic, particle swarm optimization, etc for controls. But as we know those techniques have some drawbacks like unable to operate under partially shades irradiance conditions, expensive costing and complex circuitry. So here we will try to develop such a technique which will be more efficient as well as will have less cost and simple construction.

Concept of Maximum Power Point: The principle of maximum power point is based on circuit principle when the photovoltaic cells output impedance and the load impedance are equal.

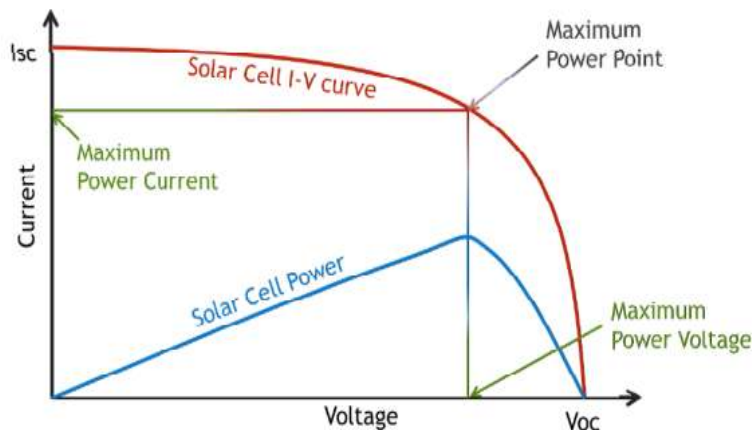


Fig.1. The relation between the characteristic $I(v)$ of a cell and a load resistor

Photovoltaic cells give the maximum power output. In this concept the control system tracks the maximum power point which can be affected by atmospheric conditions like temperature and irradiance. Thus we can see in the Fig.1, the voltage and current relationship is non-linear. Also on the IV curve, there is a point where solar panel will give its maximum power output, this is known as maximum power point. Thus we can say this principle is easy to apply, but as we know, there are positives and negatives to every system so that this system has some limitations due to local maximums and oscillations around the maximum point while obtaining that point. So because of this limitations it can be said that voltage power characteristics of a photovoltaic (PV) cells is non-linear and time varying due to the changes caused by climate and load conditions.

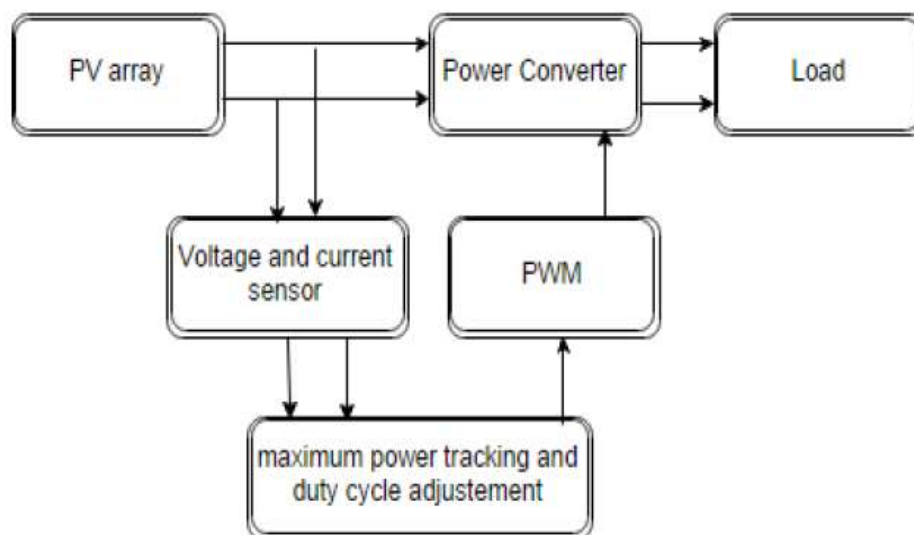


Fig.2 The MPPT Principle

The main purpose of MPPT principle is to Control the duty cycle of pulse width modulation block which controls the power converter to supply maximum power to load as shown in figure 2.

II.OBJECTIVE

The design of a voltage controlled Boost converter to deliver a high constant voltage from PV system to the load. Connected Solar cell acts as input to the designed voltage controlled DC-DC converter, where the output voltage is regulated to the load. MPPT systems includes elimination of the, proportional–integral control loop and investigation of the effect of simplifying the control circuit. Contributions are made in several aspects of the whole system, including converter design, system simulation.

III.METHODOLOGY

Among all the topologies available, both Cuk and buck–boost converters provide the opportunity to have either higher or lower output voltage compared with the input voltage. Although the buck–boost configuration is cheaper than the Cuk one, some disadvantages, such as discontinuous input current, high peak currents in power components, and poor transient response, make it less efficient. On the other hand, the Cuk converter has low switching losses and the highest efficiency among non isolated dc–dc converters. It can also provide a better output-current characteristic due to the inductor on the output stage. Thus, the Cuk configuration is a proper converter to be employed in designing the MPPT.

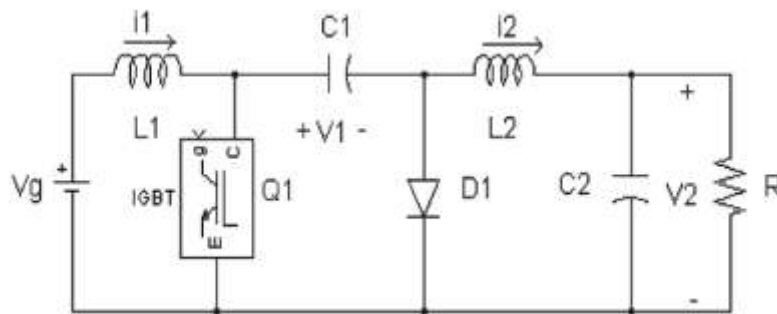


Fig.3 Circuit diagram of CUK Converter

IV.PROPOSED SYSTEM

The design of a voltage controlled Boost converter to deliver a high constant voltage from PV system to the load connected. Fig. 4 shows the block diagram of proposed system. Solar cell acts as input to the designed voltage controlled DC-DC converter, where the output voltage is regulated supplied to the load.

The converter operation is analyzed under open loop condition coupled with solar cell, it exhibits poor voltage regulation and hence, this converter is provided with closed loop control for output voltage regulation. The results obtained from the analysis in Matlab Simulink is tabulated.

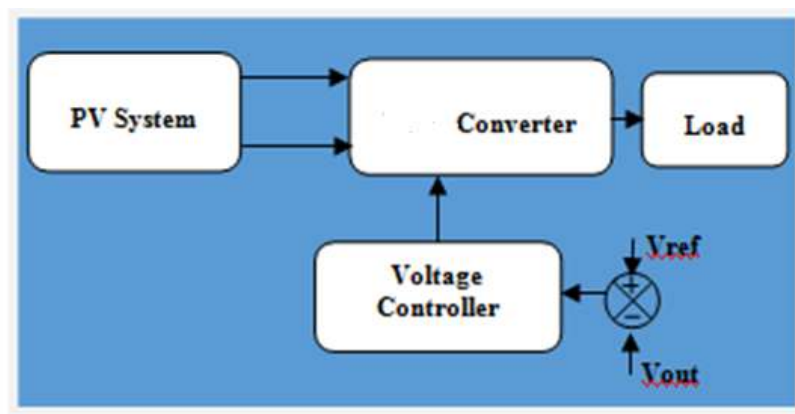


Fig.4 Simple Block Diagram

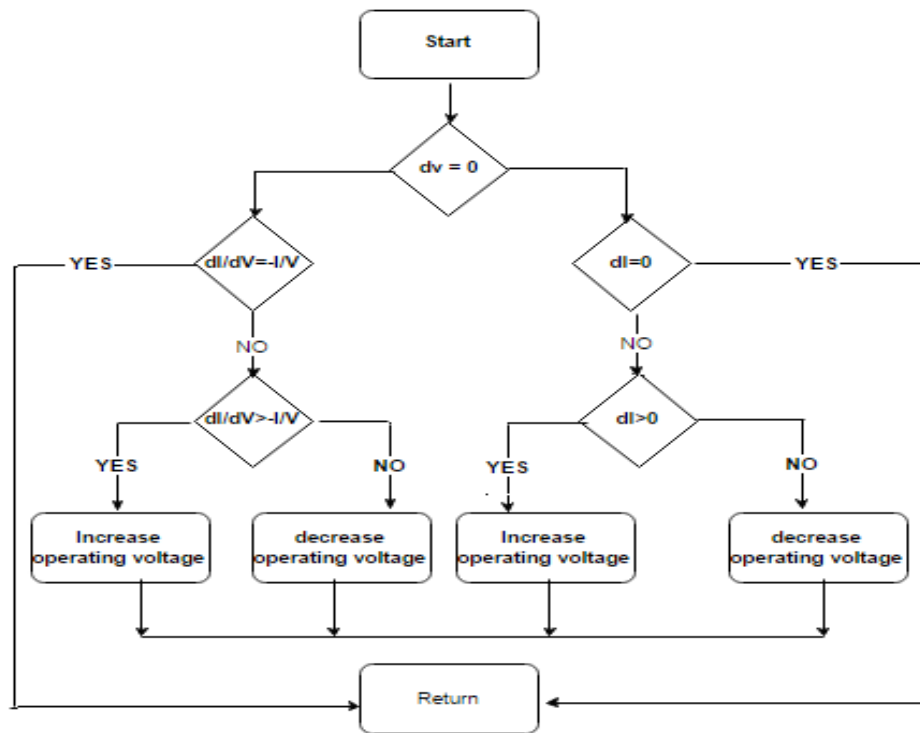


Fig.5 Flow Diagram

V.CONCLUSION

There are different methods which are used in maximum power point tracking system to obtain maximum power point. The MPPT method implemented in this paper is able to improve the dynamic and steady state performance of the photovoltaic system. So by implementing this method we will observe this complete system through MATLAB simulation from which we will be able to find the maximum power point despite of fluctuations. Also it will be helpful when external environment changes suddenly the system can track the maximum power point quickly.

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