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Advance technique applied on Photovoltaic systems and comparison with conventional technique

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Abstract — *This paper has comparison of conventional technique with new and advance technique named MCI (Minority Charge carrier) technique. In general there are so many MPPT techniques available for photovoltaic system which used in industrial & other field. Out of them some new technique have been adopted to increase stability criteria and other parameters of photovoltaic systems.*

Keywords- *Maximum Power Point Tracking, Photovoltaic, Minority Charge Carrier inspired optimization technique (MCI), Petrub &observe), MPP- Maximum Power Point, P&O-Petrub & Observe*

I. Introduction to problem

Now a days we all know the energy issues are increasing more and more day by day. And development of the electricity market has increase the use of higher power improvent and better stability. A major concern of electric utilities is to maintain the network stability and reliability. Therefore, the growing demand for electricity and the increasing use of nonlinear loads have created new challenges for power quality and stability that lead to the need for security, the network of efficient and clean AC. Rising energy transfers raise concerns about overloading steady state, increasing the risk of voltage collapse and potential stability problems. Therefore renewable energy has become increasingly attractive due to the rules of environmental protection and the severe shortage of conventional energy sources. Photovoltaic is assuming important as a source of renewable energy in place due to its clear merits, such as pollution-free ,simple architecture, allocation is easy, low maintenance cost, etc. [1]

But, the demerits is that the PV generation is intermittent, it depends upon climatic conditions. So Maximum power point tracking is now so much important than any other technique in research area in the field of photovoltaic cell. There are so many algorithms for Maximum power point tracking have come into to use for better development. While using these type of system for the production of electrical energy so many factors have keep in frame of system which mostly depends on the irradiance of solar energy and weather conditions changes. [5][2]

In next part of the paper first conventional system's analysis represented. Then after that comparison done with *Minority Charge Carrier inspired optimization technique (MCI). Analysis done on the basis of output current, output voltage, output power.*

II. Conventional method & MCI technique

2.1 Block diagram for Conventional method

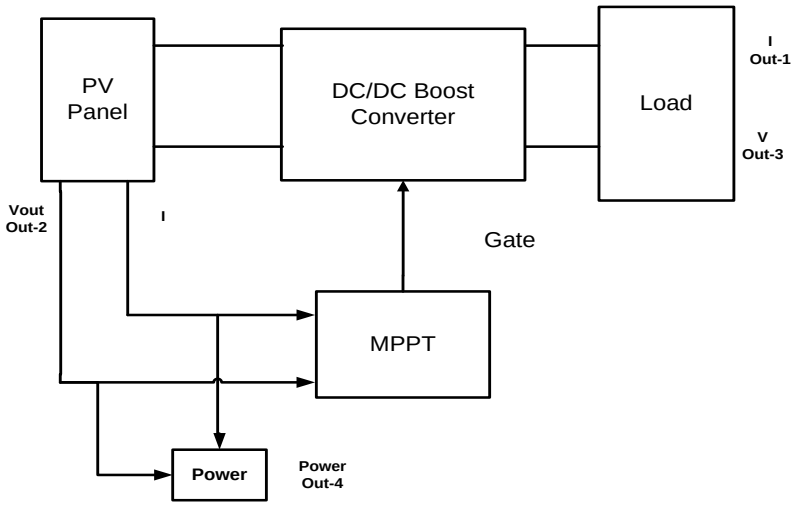

Figure 1. Block Diagram of P&O MPPT

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2.2 MCI technique Block Diagram

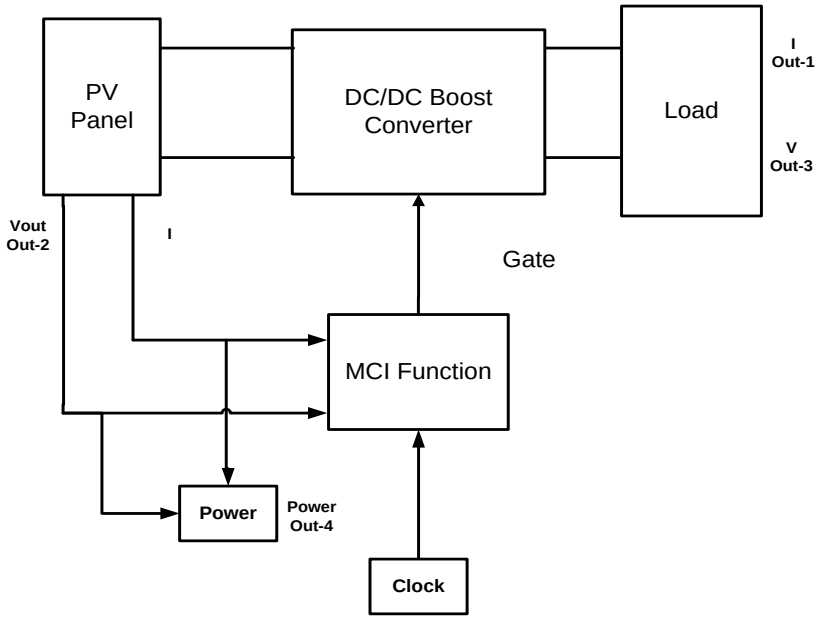
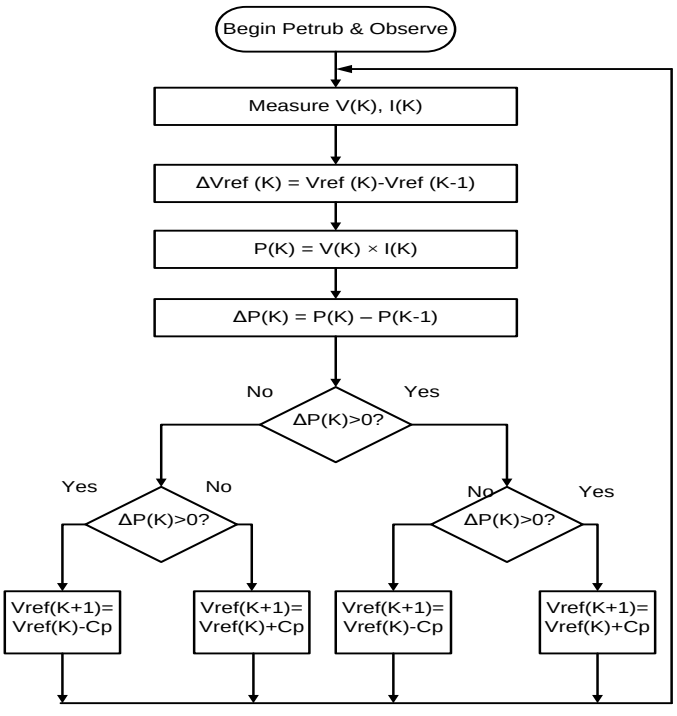


Figure 2. Block Diagram of MCI Technique

2.2 Flow Chart of P&O method



[4]

Figure 3. Conventional method flow chart

Figure 3. Shows how the conventional method work according to flow chart. First for the use of this flow chart system have to be compatible with microprocessor and the Solar panel output values like output voltage V and I panel's output current as a input values and Vreference is desired operating voltage as it's its output value. System can be inserted in the voltage-feedback controller to supply Vref that's why Vreference notation used for the desired operating

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voltage. There is another configuration is also possible that have the microprocessor and it directly controlling duty cycle d of the dc/dc boost/buck converter's PWM input. By using this type of algorithm the operating voltage V is perturbed at every MPPT cycle. When system attain its MPP, than Vmp can be obtained & it is ideal operating voltage. This voltage V will oscillate around the Vmp. Now this condition will increase power loss, and it is depend on the single perturbation's step width. If we keep width of step is large, then response time of MPPT algorithm will decreases and it will respond quickly & it affects operating condition's sudden changes, under slowly changing or stable conditions. And it will definitely increases losses. In other condition or possibility if anyone set width of the step so small then losses under slowly changing or stable conditions will reduced. In insolation or changes in temperature system's response time will be increases and system's response will be slow down. With the use of experiment value for the ideal step width is determined. [4]

If Assumption is made that the system has been oscillating around the MPP, a continuous perturbation in one direction, operating point go far away from actual Maximum power point. When increase in insolation ends or slows down up to that time process continues.

III. Comparison of Conventional system with MCI technique

3.1 MATLAB Model

By comparing both method P&O and MCI method any one find difference between two methods. In conventional method there some parameters affecting all over performance of system. While if conventional system replaced by advance method like MCI or any other technique then results automatically improved.

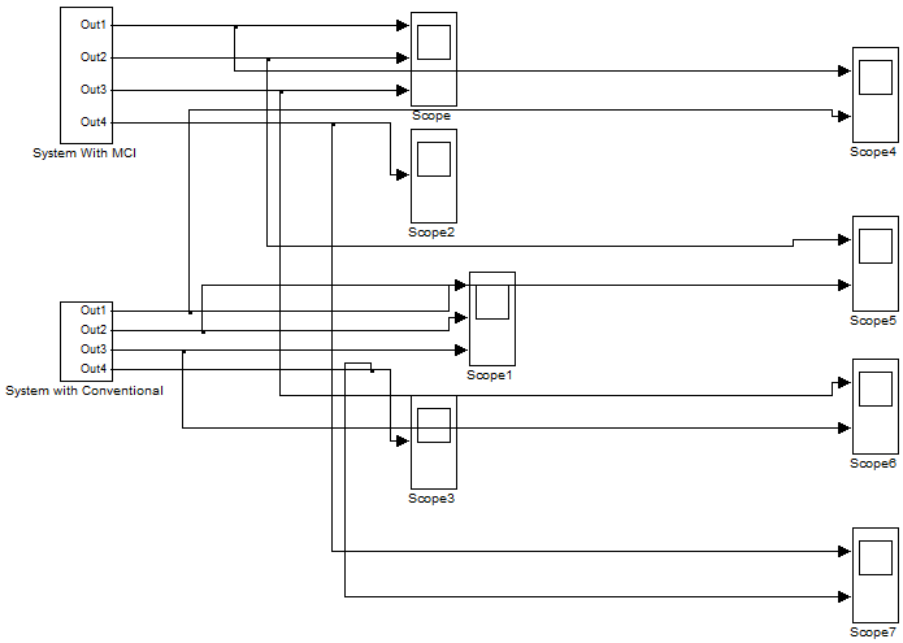

Figure 4. Comparison of both method in MATLAB

Above Figure 2. Shows how user can implement the comparison in MATLAB with use of subsystem which not shown here in diagram. And different scope has attached to different terminals of outputs which give the results and values of PV cell's output power, voltage and current. Each scope has two inputs which compare both methods different parameters at the same time.

3.2 Results and Waveforms

From above comparison some results shows the difference of the two techniques.

3.2.1 PV Current Comparison

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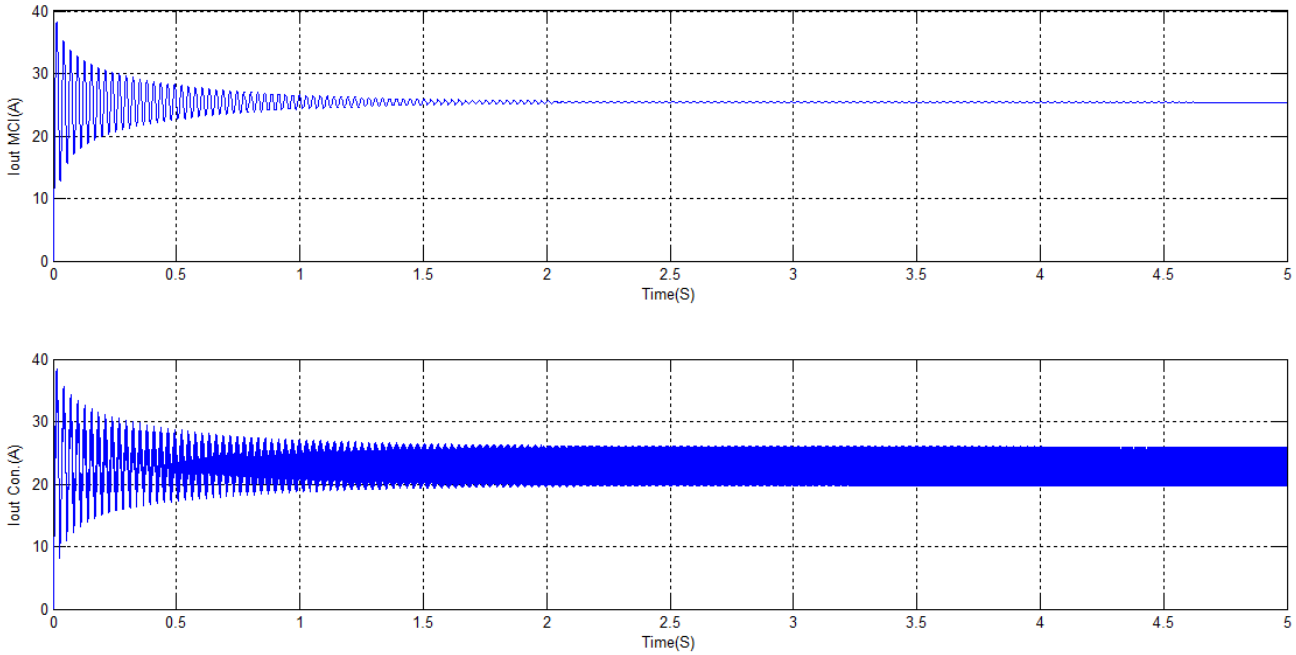

Figure 5. Ipv out

3.2.2 PV output voltage Comparison

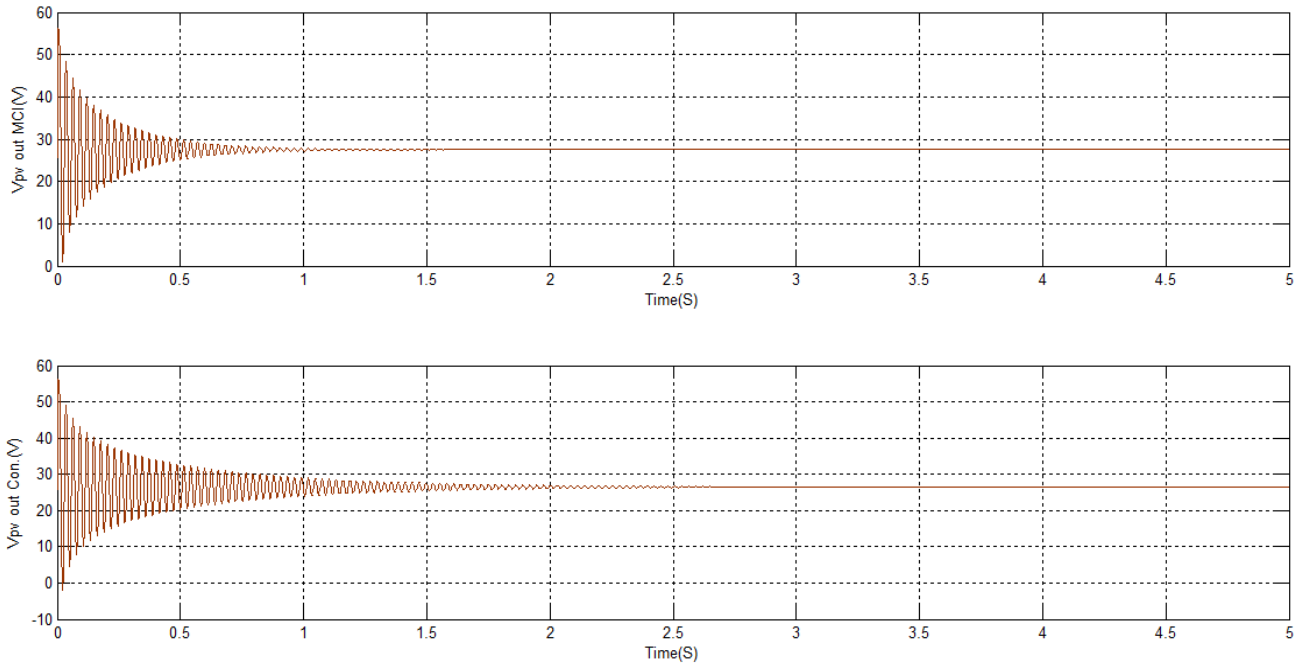

Figure 6. Vpv out

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3.2.2 V output voltage Comparison

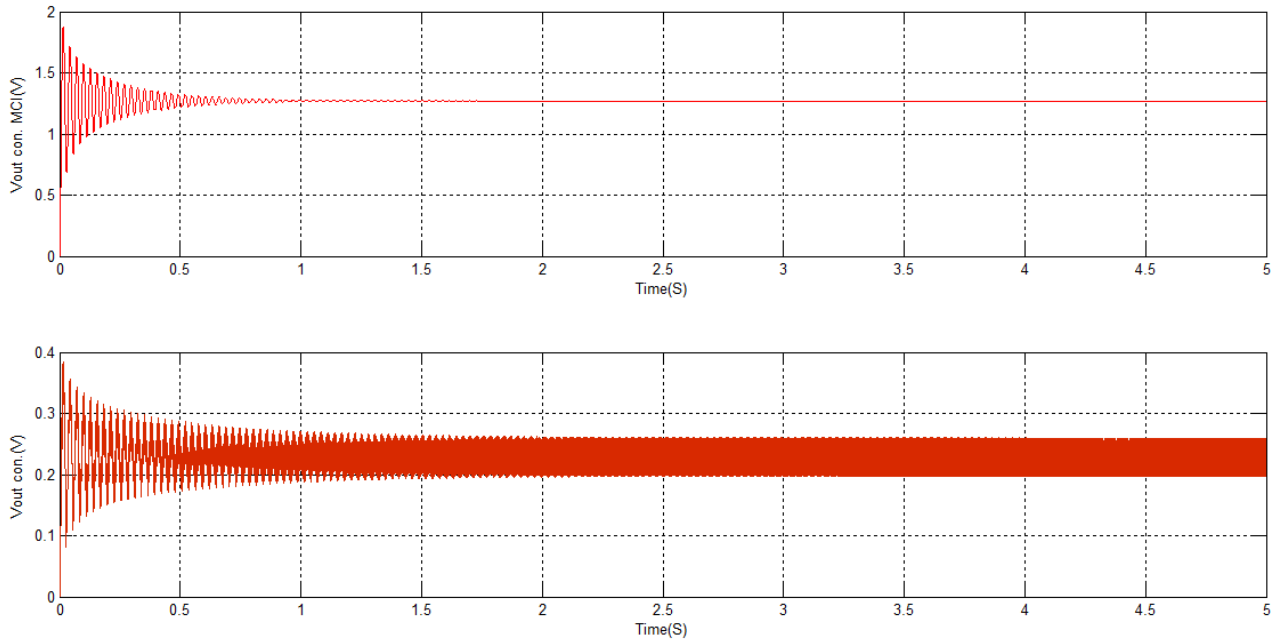

Figure 7. Vout Converter

3.2.3 Power Output Comparison

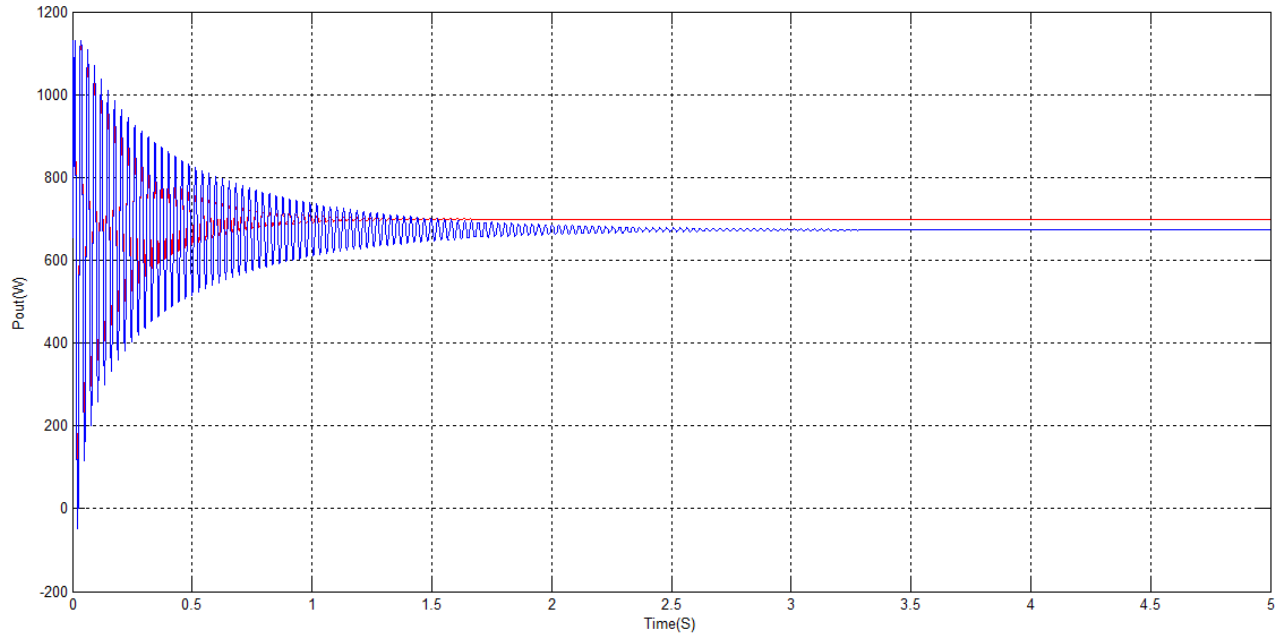

Figure 8. Pout

The above waveforms compare the output parameters of Photovoltaic cells. And by analyzing any of the four waveforms anyone know the difference in results which we got.

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IV. Conclusion

In this research paper directly comparison have been done between two MPPT techniques one is old technique but not that much effective than the new technique Minority Charge Carrier inspired optimization technique (MCI), Petrub &observe).Which shown in output waveforms in those results stability criteria and other parameters are clearly better than the conventional P&O MPPT method. So this MCI technique and also other advance techniques can be made easier to get better results from photovoltaic systems.

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