have to decrement of PMAX by a certain step size (0.5 Watt).

5. System Modeling

The block diagram of the PV system under investigation is shown in Fig. 3. The PV power system is modeled using Power System Block set under Matlab. The MPPT algorithm is modeled using Simulink blocks. The simulation parameters are summarized in Table I.

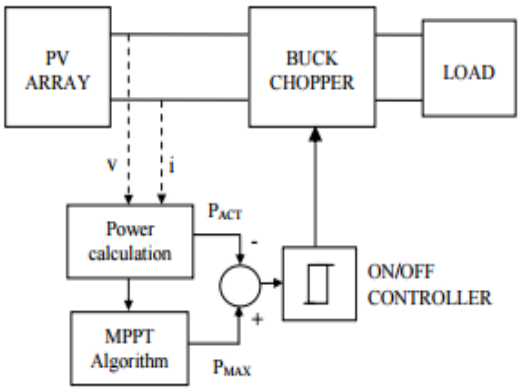


Fig. 3 Block diagram of the PV system under investigation

TABLE I
SIMULATION PARAMETERS

Sampling rate	20 kHz
C_{LOAD} R_{LOAD}	200µF 1-100 Ω
Buck Chopper	MOSFET

6. Simulation Results

In Fig.4.a, the computed maximum power PMAX and the actual extracted PV power PACT are plotted together. The PV current was 3A which is corresponding to irradiance of 1 kW/m2 .As explained before, the PMAX is started from initial value (0) and is increased gradually. According to the results, computed PMAX is 51.5 W, while the theoretical value was 54 W. So the tracking efficiency is 95 %. At the same time the direct power control algorithm keeps the actual power at 51.5 bounded between an upper and lower limit of + 0.1 W. The details of the tracking performance are presented in Fig.4.b.

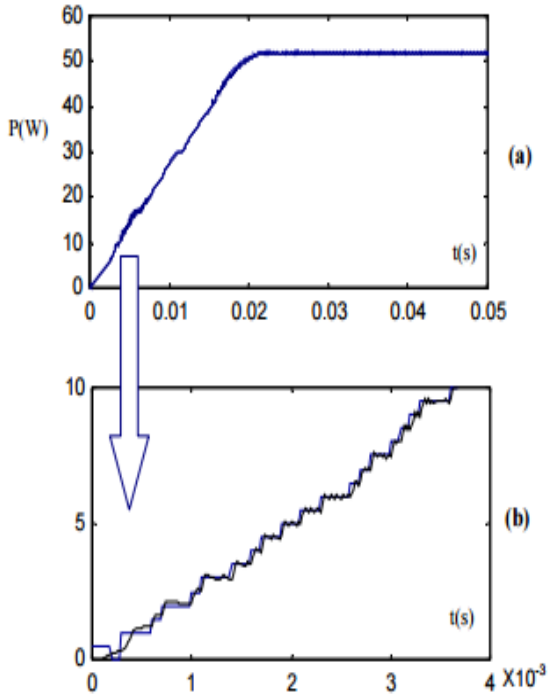
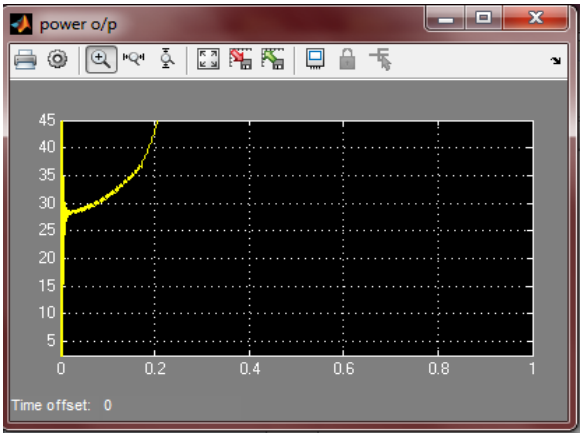
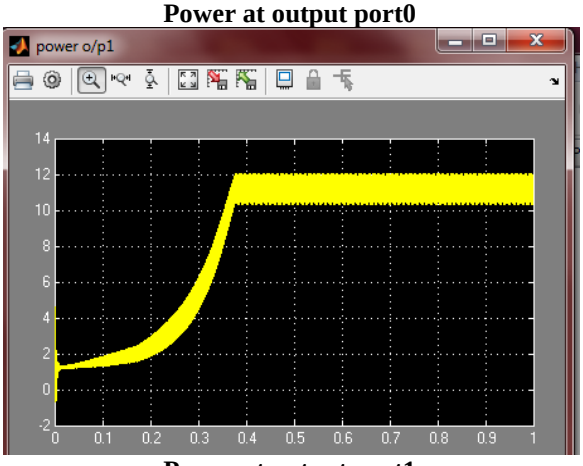


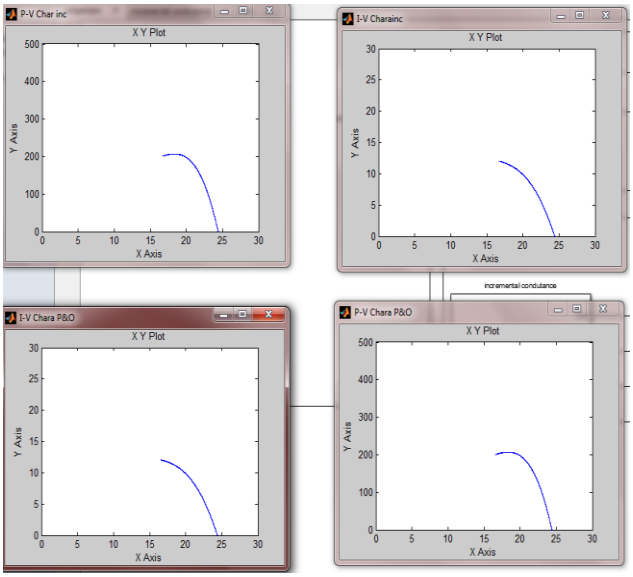
Fig. 4 Tracked maximum power and Extracted PV power
a) Overall response.
b) Performance during the 1st Four ms.



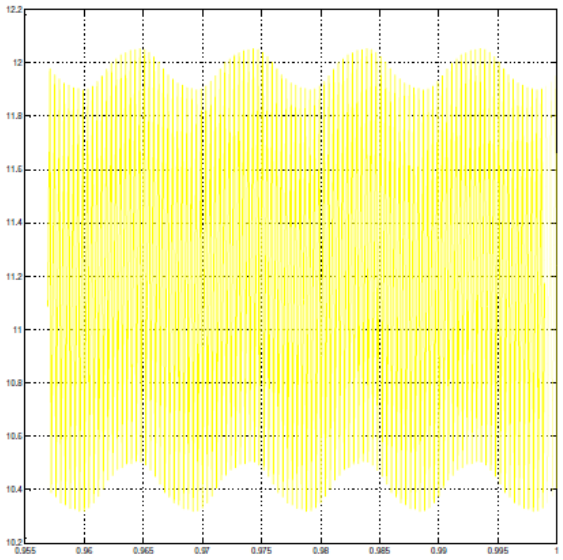
Power at output port0



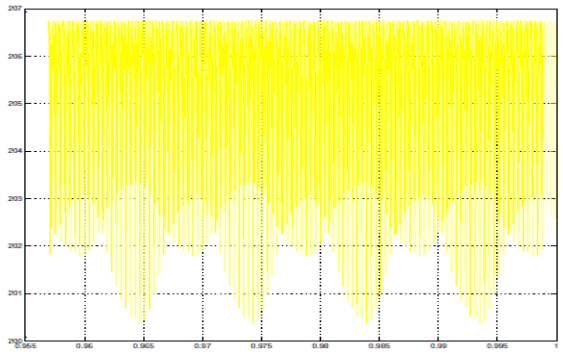
Power at output port1



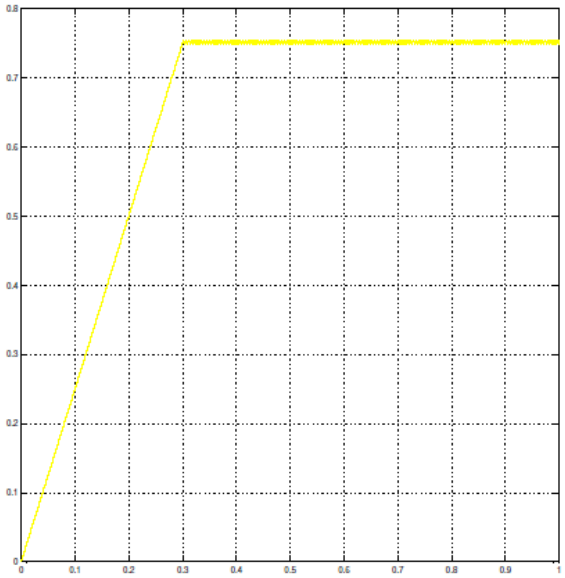
Comparison figures of I-V and P-V characteristics



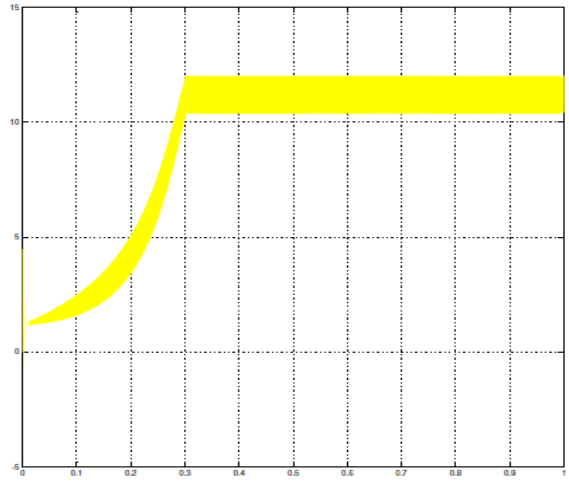
IO1_output



PV1_output_scope



D_op_inc_cond



Power_op1_inc_cond

7. Conclusion

The paper proposes a simple MPPT method that requires only measurements of PV voltage and current with the need to any environmental measurements (temperature, irradiance). The method is considered as a modified perturb and observe method. However, the principle difference between the proposed method and any other tracking method, is that the proposed method attempts to track and compute the maximum power and controls directly the extracted power from the PV to that computed value. While, any other method attempts to reach the maximum point by the knowledge of the voltage or the current corresponding to that optimum point. The proposed method offers different advantages which are: good tracking efficiency, relatively high convergence speed and well control for the extracted power thanks to the direct power control unit based on the ON/OFF hysteresis controller.

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