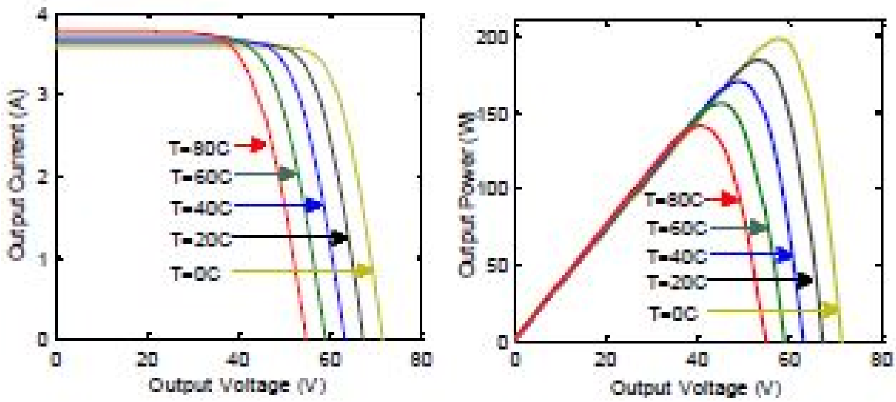

Fig 4.14 V-I and V-P Characteristics with Constant Irradiation

As Temperature increases with a constant Irradiation, the short circuit current ISC increases, because the Band Gap Energy decrease and more photons have enough energy to create Electron-Hole pairs. The increase in Temperature have an obvious reduction in the PV panel output power due to drop in the open circuit voltage VOC, thereby reduces the PV module efficiency.

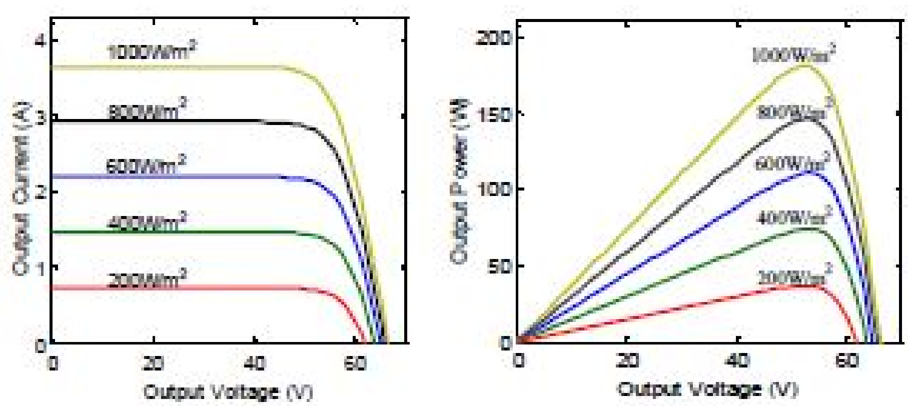

Fig 4.15 V-I and V-P Characteristics with Constant Temperature

As the Irradiation (V-I and V-P characteristics for radiations 200, 400, 600, 800, and 1000 W/m^2 are given) increases with a constant Temperature, the PV output voltage and current increases, thereby increasing the PV output power. Also, for the low values of solar radiations, the short circuit current ISC is reducing considerably but the change in open circuit voltage VOC is very less, thus proving that the maximum power from the module is dropping.

V. CONCLSUION

From the simulation it observed that the power obtained at the load side was 90Watts for a solar radiation of 80Watts per square meter when the switch was on No MPPT mode which bypasses the MPPT algorithm block in the circuit. Also, the conversion efficiency was very low as the PV panel power generated was 200Watts with the same solar radiation of 80Watts per square meter.

When the simulation was switched on to MPPT mode, which includes the MPPT block and the PI controller, the PV panel continued to generate 200Watts power, and it was observed that the obtained power at the load side is 190Watts, which shows that there is an increase in power in conversion efficiency of the PV system using the solar irradiation of 80Watts per square meter of 200Watts power.

Therefore, it was observed from the Simulation that using the Perturb & Observe MPPT technique increased the efficiency of the photovoltaic system by 111% from an earlier output power of around 90Watts to an obtained output power of around 190Watts.

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