

Designing of MPPT Solar Charge Controller

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Abstract - The growing demand for renewable energy, the demand for PV electricity has expanded even more due to its abundant supply and ease of control.

Key Words: PV, Renewable energy.

1.INTRODUCTION (Size 11, Times New roman)

Solar photovoltaic system is a source of renewable energy. It is an emerging alternative that can play a vital role in supplying electricity for long-term sustainability. Nowadays a major problem in the power sector to deal with is the rise in the power demand on daily basis but the failure of conventional energy sources to meet the demand alone. PV cells offer great potential as solar energy is abundant and cell operation is noiseless, and free from harmful emissions. The major and traditional sources of electric power generation in India include coal, petroleum, natural gas, and other fossil fuels etc. But in recent years nonconventional/ renewable sources like solar energy in electric power generation is gaining interest due to many reasons. In solar power generation, the PV modules used are very costly hence optimal use of solar power is essential. This mandates an accurate and appropriate design of PV systems prior to installation.

2. Body of Paper

A solar PV cell turns sunlight directly into energy, which is a physical process known as the photovoltaic effect, which is explained in more detail below. According to the solar spectrum, energy is delivered in the form of light, which is formed of photons and contains a variety of various energy levels depending on the wavelength of the light. When sunlight is absorbed by a solar cell, the vast majority of the photons may be absorbed, but some may be reflected back into space. Only the light that has been absorbed is transformed to electricity ..A solar PV module's ability to generate dynamic electricity is related to variations in ambient and climatic conditions, which are key aspects to consider when evaluating solar PV modules. It is the equivalent circuit characteristics that determine how accurate a solar PV module simulation will be when modelling and simulating a solar PV module. Any solar cell equivalent circuit that is primarily defined by a current source in parallel with a diode is referred to be an ideal equivalent circuit. The fundamental equation, which can be derived from semiconductor theory and quantitatively defines the current-voltage ($I-V$) characteristic of the ideal solar PV cell, may be found in the literature.

Table -1: Specification of Solar panel

PARAMETER	RATED VALUE
Rated Power(Pmp)	200W
Voltage at Maximum Power(Vmp)	26.4V
Current at Maximum Power(Imp)	7.58A
Open Circuit Voltage(Voc)	32.9V
ShortCircuit Current (Isc)	8.21A
TotalNumberofcellsInSeries(Ns)	55
Total Number of cells inParallel (Np)	1

PV Panel rating Solar PV module model is developed under MATLAB/Simulink environment by using the previously discussed mathematical equations of solar cells. The final Solar PV model shown below as depicted in are simulated and obtained output results as current, voltage and power, due to the variation of radiation and temperature as input parameters.

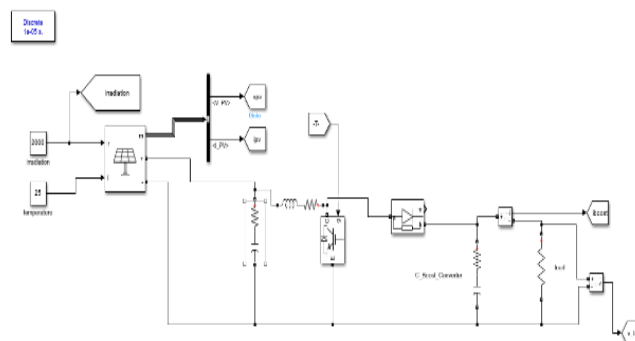


Fig -1: Full Simulation Block

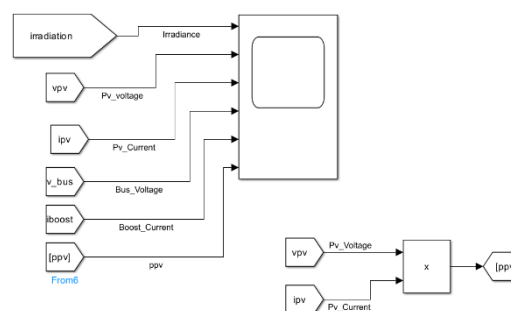


Fig -2: Scope Block

3. CONCLUSIONS

The present research was carried out to check the performance in terms of maximum power of the Solar PV cell model on different temperature and the result reveals that the maximum power was achieved at minimum temperature. The proposed work also examined the best alternative materials which can replace the existing material for better thermal properties.

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