

Review Paper on Residential Grid Connected Photovoltaic System using MATLAB system

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Abstract - In today's world population are rapidly rising exponentially and there are a huge demand for energy. There are two types of sources of energy renewable and not renewable. Nonrenewable is also known as a fossil fuel, for example, coal, petrol, diesel and much more. Fossil fuels produce a huge quantity of hazards gaseous which directly or indirectly affects us and another big problem is that as per today's demand in near future on renewable sources would be depleted. To see this scenario an approach for renewable energy sources would be taken and currently all around the world every country focusing on renewable energy resources due to various advantageous. First of all renewable energy is clean energy and there is no emission of hazards works which affects our health system. Generally renewable energy consist solar energy, hydro energy, wind energy, thermal energy and many more. Out of these resources solar power is best one as sun is the resource and provide us huge amount of energy continuously. Now main focus is to convert solar energy into usable form and for this process various option are available and in our research work we will used Polycrystalline Silicon PV Module. Efficiency of this panel is not so much high that's why a range of methods are available to boost DC energy. In our research work Maximum Power Point Tracking will be used.

Keywords: Total Harmonic Distortion, MPPT, Renewable, Polycrystalline, Grid, Hybrid Renewable Energy system.

I. INTRODUCTION

The demand for electrical energy is becoming twice as fast as overall energy use and is likely to rise 76% by 2030 [1] [2]. The conservative electric power generation systems in the world are based on fossil fuels (coal, oil and natural gas), nuclear power and hydropower. The fossil fuels and nuclear fuels are not renewable and reserves of these fuels will run out some day in the future, where as in the case of hydropower, sources are insufficient and the sites are normally far away from load centers. Further, generation of power via conventional means is also causing damage to the environment, due to large scale combustion of hydrocarbon-rich fossil fuels, which adds a large amount of

dangerous gaseous pollutants to the atmosphere. Among these, the release of CO₂, a major greenhouse gas, is largely responsible for Global Warming [3]. Another point of concern is that in many overpopulated countries, like India, there is a dearth of power generating resources and as a result, many cities and towns are facing constant load shedding and blackouts. The existing centralized power generation units are not plenty to meet the continuously rising power demand. Many consumers are forced to invest big amounts of money to meet their contingent load during power cuts and also to cater to the peak load demand locally by using conventional diesel generators [7-9].

Thus there is a rising interest in alternative energy resources such as solar energy systems to produce clean and sustainable electrical energy [6]. The utilization of solar energy has become an essential measure to address present energy shortages and environmental problems. We have several reasons to be optimistic as there is great excitement about the possibilities opening up before scientific community in the field of solar P

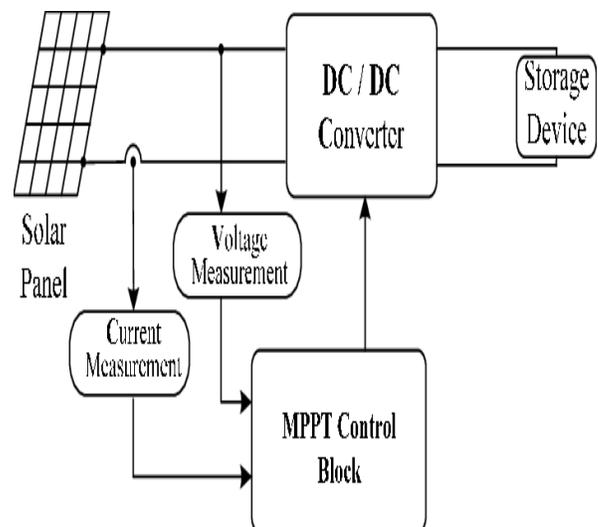


Fig.1: solar system description

II. LITERATURE SURVEY

Natarjan Pandiarjan, Ramabdran Ramaprabha, and Ranganath Mathu: Developed Circuit model of PV module is presented in their research and that can be used as a common platform for material scientists and power electronic circuit designers to develop the PV power plan. Detailed modeling process for the circuit model with numerical dimensions is presented using power system block set of MATLAB/Simulink. The developed model is integrated with DC-DC boost converter with closed-loop control of MPPT algorithm. Simulation results are validated with the experimental setup [17].

Juan A. Lazzús, Alejandro A. Pérez Ponce, and Julio Marín: developed an artificial neural network for the estimation of hourly global solar radiation using data measured from a meteorological station. In this model data used were: wind speed, relative humidity, air temperature, and soil temperature and finally results were compared with the original data and other models available in the literature, and shows that the neural network obtained can be properly trained and can estimate the hourly global radiation with acceptable accuracy. The meteorological data used have influential effects on the good training and predicting capabilities of the chosen network.

III. WORKING OF PV CELL

The basic theory involved in working of an individual PV cell is the Photoelectric effect according to which, when a photon particle hits a PV cell, after receiving energy from sunbeam the electrons of the semiconductor get excited and hop to the conduction band from the valence band and become free to move. Movement of electrons create positive and negative terminal and also create potential difference across these two terminals. When an external circuit is connected between these terminals an electric current start flowing through the circuit.

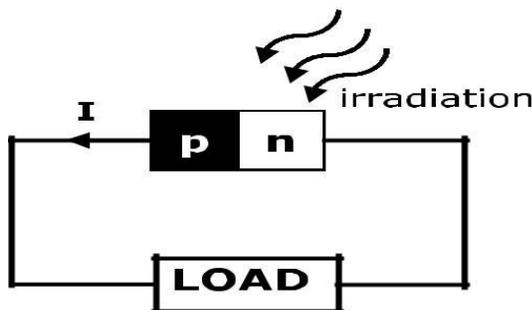


Fig 2. Working of PV cell

IV. SOFTWARE USED

Software: MATLAB Version R2017a: It is powerful software that provides an environment for numerical computation as well as a graphical display of outputs. In Matlab, the data input is in the ASCII format as well as binary format.

V. SIMULATION RESULT

It is a high-performance language for technical computing integrates computation, visualization, and programming in a simple way where problems and solutions are expressed in familiar mathematical notation

- Acquisition, Data Exploration, Analyzing & Visualization
- Engineering complex drawing and scientific graphics
- Analyzing of algorithmic designing
- Mathematical and Computational functions
- Modeling and simulating problems prototyping
- GUI (graphical user interface) building environment.

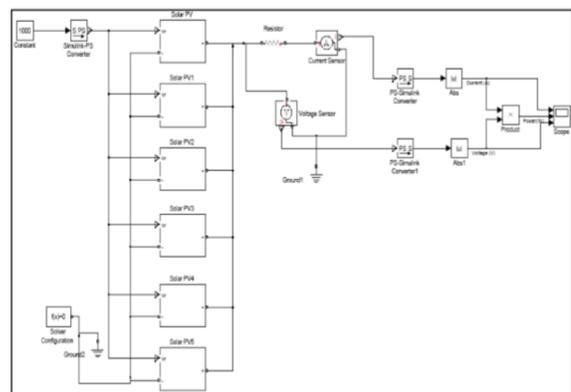


Fig. 3: MATLAB model of solar system

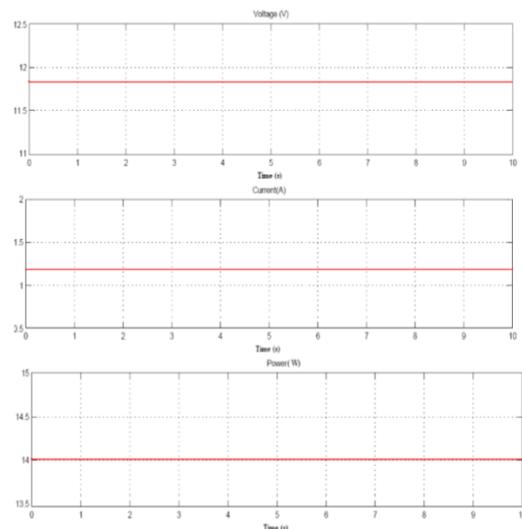


Fig. 4: The output waveform of solar system

VI. CONCLUSION

After studying various research papers finally, we came to know that to meet the demand of world in future energy must be renewable for example solar energy, wind energy, hydro energy and much more. Out of this Photovoltaic solar electricity is the most elegant method to produce electricity without moving parts, emissions or noise and all this by converting abundant sunlight without practical limitations. The relevance of solar energy specifically PV can be justified mainly with the factors like scalability, environmental impact and the security of source. The scalability means the abundant availability of the solar radiation to be utilized for PV. Solar cells are zero emission electricity generators, which prove its environmental friendliness. And the security of the source means individual and the country does not have to rely on others for source unlike fossil fuels, nuclear power etc. This is the reason why there is a worldwide major push to solar PV, despite its higher generation cost compared to the conventional counterparts. Improvement can be done by tracking the maximum power point in changing environmental conditions such as variation in solar irradiance as well variation in temperature.

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