

Solar Based Agricultural Pumping Using DC Pump

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Abstract: -- Nowadays, in our country diesel based pump and non-renewable sources are used for agriculture pumping application. Which having certain disadvantages like cost, pollution efficiency to overcome that solar energy is based alternative to agriculture pumping? The main objective of this project is to study literature review of pumping technology. The current state of solar pumping technology is that factors affecting of solar pumping and how solar water pumping system works. Solar water pumping system mainly consists of two components. One is a PV Panel and another one is the pump. When solar panel exposed to sunlight DC current is produced. This current is given to DC pump and it pumps the water with getting good efficiency and less maintenance.

Keywords: DC-Direct Current, PV-Photovoltaic.

1. INTRODUCTION

Water pumping is mostly depending on the conventional electricity or diesel generated electricity. Dependences of diesel, gas or coal based electricity minimizes by the solar water pumping. Mostly it commonly uses the diesel energy in the agricultural operations because it can be used when we want and where we want. But it can be has some significant drawbacks such as fuel is required for operation so for long distance we want to transport which is quite difficult. Because of this diesel energy the noise pollution is spread out which can disturb the life of normal human being. It require more costly fuel s it can be required the long life maintenance and system is break in the operation which can also replace.

Now a days, for agricultural need we have alternative like the solar energy. Modern, well-designed simple to maintain solar system can provide the energy that is required. This energy can be used in any place and when we want that time we use it. These are system that have been tested and proven around the world to be cost. Effective and reliable and they are mostly increasing for the agricultural productivity.

The recently year the photovoltaic is used more for the generation of the electricity. In the remote area and in the islands it is widely used so they are not facing problem. Using photovoltaic as the power source for water pumping is considered as one of the most promising areas of the PV application. In the photovoltaic water pumping required as the photovoltaic array, controller, motor, pump and water supply system. Particularly the water supply in the remote area where the electricity is not available there the photovoltaic water pumping system is used. The advantages of using water pumps powered by

photovoltaic system include low maintenance, ease of installation, reliability and matching between the power generated and the water usage is need.

2. SOLAR ENERGY

In the solar energy the main part is the photovoltaic which is now well-established technology in the world wide. PV is increasingly more cost effective comparing with other conventional energy which can use in the remote area. Where PV systems are more economical in providing electricity at the remote area location on the farms, ranches, orchard and other agricultural operations. The remote area mostly the electricity is supplied which can be drawback for it. By using the photovoltaic panel it can generate the electricity. The solar cells in the PV module are made up from the semiconductor material. When the sun shine and that light is strike on the cell, electrons are knocked loses from the material atom. Electrical conductor attached to the positive and the negative side of material allows the electrons to be captured in the form of the DC current. This electricity is can be used to power a load such as a water pump, or it can be stored in a battery. These PV systems is much cheaper than the installing power lines. The many application of these photovoltaic in the agricultural technology.

3. SOLAR PHOTOVOLTAIC WATER PUMPING TECHNOLOGY

The Direct coupled DC solar pumping was first introduced in the 1970s. But earlier PV water pumping systems have limitations of overall performance of the system due to lack of the proper design. So now it can be improves there performance and the reliability. The Direct coupled DC solar pumps are simple and reliable but it

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can't use for the maximum power by changing in the climatic condition. So we can be used the controller likes boost converter etc. for the constant supply. The solar water pumping by using the motor which can done mostly for the low power it has two types DC motor with brushes and without brushes. Where by using the brushes it required the frequent maintenance due to commutation and sliding brush contact. So it has to remove always brushes.

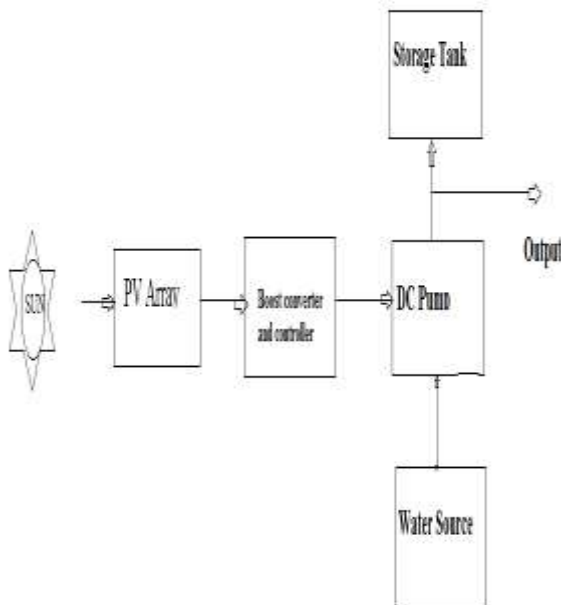
The solar water pumping by using AC motor. By using the AC motor it has many advantages but the efficiency and there dynamic performance is compared to less than DC motor.

4. SYSTEM OPERATION

Solar water pumping using DC pump has

1. Solar energy
2. PV Array
3. Boost Converter and controller
4. DC pump
5. Water source
6. Storage tank

The output of this water pumping system is to maintain constant voltage. Here we use a DC motor to convert the electrical energy into hydraulic energy.



Block Diagram – Solar water pumping using DC pump

1. SOLAR ENERGY-

When the light is strikes on the solar panel the PV technology has the conversion operation. Which can be converts sunlight energy into the electricity? This electricity is not constantly because of the climatic problem so the electronic instrument is used to make the constant supply. Here we use the Boost converter.

2. BOOST CONVERTER-

The boost converter is a medium of power transmission to perform energy absorption and injection from solar panel to grid. In these boost converter there is a combination of four components are inductor, electronic switch, diode and output capacitor is used for process of energy absorption and injection. In these pulse width modulation technique is used which can be used at constant switching frequency, adjusting the on and off duration of switch. Here there are two mode continuous conduction mode and discontinuous conduction mode. Continuous conduction mode can get from the boost converter. The boost converter is connected to the DC motor.

3. DC PUMP

DC motor is connected to the DC pump because it can convert the electrical energy into the mechanical energy. The DC pump is the conversion of electrical energy into the hydraulic energy and these energy is used for the lifting the water.

5. RESULT

In this work in the designing work, we analyses the boost converter parameters. By using the boost converter we can boost the voltage as we required. The simulation circuit can be get that design can is simulated in National Instrument Versions Software.

6. CONCLUSION

This paper can conclude that the latest status of the water pumping technology and their improvement. The solar water pumping system has various advantages. Based on the study main conclusion as the PV water pumping technology is reliable and economically viable alternative

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to electric and diesel water pumps for irrigation of agriculture crop.

These PV water pumping which can mostly use in remote area can be decrease the cost which are used for diesel based pumping. These PV is cost with energy source for small, remote applications if the total system design and utilization timing is carefully considered and organized to use the solar energy as efficiently as possible.

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