PV BASED WATER PUMPING SYSTEM USING BOOST INVERTER FED INDUCTION MOTOR

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Abstract

The project introduces a simple, cost-effective agricultural pump system. Contains a list of PV, canonical switching cell converter (CSCC), Boost inverter, and motor induction. The input power of the boost inverter is available from CSV based photovoltaic (PV). The need for a minimum number of current input items that do not include power is a high feature of the CSC converter. The DC power conversion is obtained from a PV-converted CSV-based system to high voltage AC using an inverter reinforcement is a key feature of the proposed system. The maximum power output in the PV system is verified in this paper using the P&O MPPT algorithm. Due to the converter that promotes CSC converter and boost inverter, this system requires a small number of PV arrays to enable induction motor pump system. The effectiveness of the proposed system is verified by the MATLAB/SIMULINK environment and the required results are presented.

Keywords: Boost inverter, Canonical Switching Cell Converter(CSCC),Induction Motor, Maximum Power Point Tracking (MPPT),PhotoVoltaic(PV)array.

Introduction

The rapid growth of energy technologies, the elimination of fossil fuels and the effects of global warming that drive communities to use renewable energy sources (RES) for a variety of applications. The automotive PV pump system is receiving a lot of attention in the agricultural sector. Typically, this can be done with a two-step conversion system, i.e. DC-to-DC conversion using a boost converter or buck-boost converter and a DC-to-AC conversion using a voltage source inverter (VSI). Although the lifting converter provides high power output, it does not provide a smooth start to the vehicle. Some consolidation converters

like CUK and SEPIC converters require a large number of factors that make them powerful and inefficient. In addition, VSIs cannot provide high AC output from low DC input. To overcome the above problems, this paper proposes to simplify, and cost, the cost of strengthening the inverter fed motor induction motor using the PV based CSCC water pump system in the agricultural sector. The advantages of the CSC converter are the inclusion of current and low power input.

In both agriculture and domestic, the water pump system provided by cell-generators is one of the most important applications. Installing a pump through the action of controlling motors by building new efficient and flexible systems, this can be done by taking into account the variations in solar energy and the requirements for solar power generation. Photovoltaic-battery hybrid system usually controls the vector control of a non-compliant vehicle, this vector control is discussed in this paper .PV generator, DC-DC converter, battery, DC-AC converter, import vehicle vector-controlled and centrifugal pump are investigated in this paper. With interference and viewing (P&O) algorithm combined with power conversion control, PV generator can be used with great power. In all segregation cases, vehicle delivery is also guaranteed. The effectiveness and efficiency of this method is indicated by the simulation results. Extensive results are presented based on MATLAB / SIMULINK.

Literature Survey

"PV Based Agricultural Pumping System uses boost inverter fed motor induction", VSPrasadarao Kodavatiganti, K,Nagalinga Chary AVRavikumar, ShriVishnu Engineering College for Women. International Journal of Modern Technology and Engineering October2019.

This paper presents the simple and cost- effective drive system for agricultural pumping system. The proposed scheme requires less number of PV arrays to run the single-phase induction motor. The P & O MPPT algorithm used in this paper is effectively tracked the maximum power from the PV array. The CSC converter and Boost inverters used in the proposed scheme enhances the low voltage input into high voltage required for the induction motor. Due to the lower components presented in both converters reduces the size and implementation cost of the system.

"Standalone Photovoltaic Water PumpingSystemUsesInductionMotor Drive with Reduced Sensors", Bhim

Singh, Fellow, IEEE, Utkarsh Sharma, Member, IEEE, and Shailendra Kumar, Member,IEEE,DepartmentofElectrical Engineering, Indian Institute of TechnologyDelhi,NewDelhi,India.

An independent water pump system has been proposed. It uses only three sensors. The reference speed of the V / f control system is proposed based on the available power control capacity of the DC bus. PWM frequency and pump proximity regulation have been used to control the speed of the induction motor. Its performance is verified by simulation and test validation. Various working conditions such as starting, radiation variability and stable condition have been confirmed by trial and found satisfactory. A major contribution of the proposed control system is that, naturally, it is protected from error in the pumping station measurement. The system follows the MPP with acceptable tolerance or radiation.

Problem Identification

Presence of less number of components in the CSC converter makes it more efficient. The most important characteristic of the boost inverter is it is able to generate high AC output voltage than its DC input voltage. That means it is not only performing DC to AC conversion but also provides enhanced AC output voltage, unlike VSI which provides less output voltage from input DC source.

Voltage enhancement feature of CSCC and boost inverters of the proposed scheme reduces the rating of the PV system. Soft starting of the induction motor is ensured by the canonical switching cell converter.

Perturbation and observation (P & O) MPPT algorithm is used in this project to operate the PV array at maximum power point. Finally, the effectiveness of the proposed scheme is verified with the help of MATLAB/SIMULINK software and corresponding results are presented.

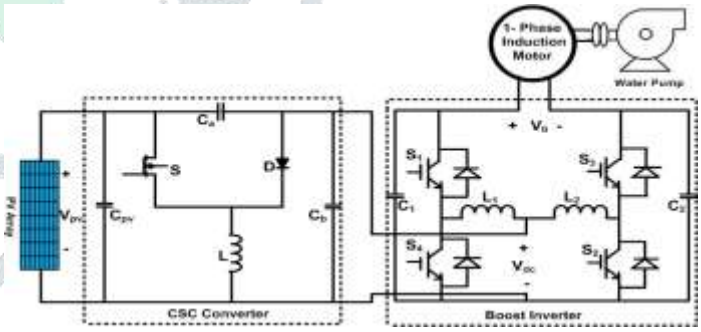

Fig. 1. CSC Converter fed Induction motor for Water pump

PROPOSED CONFIGRATION WORK

For improving overall efficiency various optimization methods have been discussed. Presently, for power

conditioning, PV generator works as a DC-DC converter for MPPT. There are several types of converters used for MPPT, they are boost converter, buck converter and boost-buck converter. Many different motors are used in PV water pumping system. PV pumping system with induction motor gives another way for a more reliable and no maintenance system. For the usage of DC motor in PV water pumping system various coupling modes are maintained.

Different control methods should be used for Permanent Magnet Synchronous Motors (PMSM). Because of the superior advantages of induction motors over DC motors and PMSM , in this project, induction motor is used for water pumping system. In Induction motor (IM), an indirect method of motor field control method regarding water PV pumping system is presented by the authors. Water pumping system with proposed photovoltaic battery is shown in Fig.. A large simulation work is done for obtaining required results. For showing the performance of the system, the obtained results are talk over and proved that how the suggested process is a best functioning procedure of water PV pumping system control.

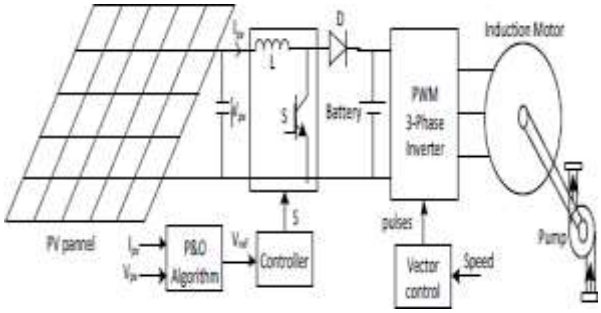

Fig.2.The suggested Induction motor photovoltaic pumping system configuration

The following figure 2 shows the overall structure of the boost inverter fed induction motor drive employing PV based CSC converter for water pumping system. It contains a list of PV, CSC converter, booster inverter, import vehicle and water pump. The power requirement of the water pump is achieved from the PV array via CSCC and boost inverter.

Objective

The primary objectives of this study can be summarized as follows:

1) *To study the existing solar water pumping system.*
2) *To understand the existing CSC Converter fed Induction motor for Water pump .*

3) *To study the Induction motor photovoltaic pumping system configuration using P & O Algorithm.*

4) *To study simulation validations of the proposed system.*

Conclusion

This project presents the simple and cost-effective drive system for agricultural pumping system. The proposed scheme requires less number of PV arrays to run the single-phase induction motor. The P & O MPPT algorithm used in this project is effectively tracked the maximum power from the PV array. The CSC converter and Boost inverters used in the proposed scheme enhances the low voltage input into high voltage required for the induction motor. Due to the lower components presented in both converters reduces the size and implementation cost of the system.

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