

Title: Solar water pump synchronization

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How can we improve the efficiency of solar water pumping systems?

To improve the efficiency of solar water pumping systems, Ref. 21 provided a novel fractional-order fuzzy-MPPT approach. By covering parts, system viewpoints, and sophisticated control techniques for increased efficiency, these publications together boost our knowledge and development of solar water pumping systems.

How can a solar pumping system be used for unidirectional power flow regulation?

By integrating the utility grid with a PV array for unidirectional power flow regulation, a double-stage reliable solar pumping system is developed in this work. By introducing a single-phase voltage source converter (VSC) into the drive architecture, the drive can also feed local loads.

What is a solar water pump system?

The basic block diagram of the solar water pump system is shown in Fig. 1. It consists of an autonomous solar array, an essential DC-DC boosting converter, a three-phase Voltage Source Inverter (VSI), and an induction motor coupled to a centrifugal pump that circulates water.

How does solar power affect water pumping?

These elements reduce the dependability of water pumping. Because these systems are powered by solar radiation, water pumping is halted at night and during severe weather. Furthermore, the pump operates at a lower voltage when the PV insolation received is less than the intended capacity.

Synchronous reluctance motors (SyRMs) due to their attractive benefits over conventional ac machines, better efficiency, robust design and absence of rare-earth permanent ...

This control method ensures the synchronization of the water pump's performance with the available solar-generated power. The interaction of the PV array, DC boost converter, three ...

An interactive solar water pumping unit (SWPU) with enhanced frequency locked loop (FLL) based synchronization to ensure uninterrupted power for smart residential prosumers is ...

The storage tanks either utilize diesel powered water pumps or utility grid fed water pumps [2]. So, a robust control of grid integrated solar photovoltaic-based storage tower water pump system ...

Abstract Solar-powered pumping systems using series pumps are commonly applied in the delivery of water to remote agricultural regions, particularly in hilly tropical terrain. The synchronization of these ...

This article deals with control of a single-phase grid-connected solar photovoltaic (SPV) array based synchronous reluctance motor (SynRM) driven water pumping system with seamless ...

This study presents the design and implementation of a Synchronous Reluctance Motor (SynRM) with an integrated drive circuit for a 4-inch submersible pump motor, tailored for small-scale ...

The paper is structured as follows: Section " Solar water pumping system design " provides a comprehensive overview of the Photovoltaic Water Pumping System and its key ...

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