SolarInvert Energy Solutions

Intelligent Wind Power Generation Control System

Overview

What is a wind power generation system (WPGS)?

This scholarly paper offers a wind power generation system (WPGS) that utilizes a configuration of parallel five-phase permanent magnet synchronous generators (PMSGs). The control mechanism for this system is based on a fifteen-switch rectifier (FSR) topology, which is specifically designed for grid-connected applications.

Can deep reinforcement learning improve wind farms' power-generation efficiency?

Wind farms’ power-generation efficiency is constrained by the high system complexity. A novel deep reinforcement learning (RL)-based wind farm control scheme is proposed to handle this challenge and achieve power generation optimization.

Can a wind farm control system improve power production?

Simulation results show that our method can significantly improve the wind farm’s total power production by 15% on average compared with the benchmark. The proposed control scheme is application-oriented. (1) The training and learning data (power output and yaw angle of each turbine) are easy to collect.

Can a hybrid controller improve the performance of a PMSG-based wind turbine?

In this paper, the proposed WTPGS system is designed in MATLAB/Simulink software where a hybrid controller (ANFIS-PI) is implemented in the machine-side converter (MSC) and grid-side converter (GSC) of a variable speed PMSG-based wind turbine to enhance its performance subjected to wind variations.

Can deep RL-based wind farm control improve power generation optimization?

The following results will show that our deep RL-based wind farm control

method can achieve power generation optimization under such a sparse dataset collected by SOWFA. These results indicate that our method can use limited sets of actual wind farm data for algorithm training and learning purposes, and has strong applicability to real wind farms.

How does the Integrated wind power system work?

The integrated WPS operates in both motor and generator modes, depending on the excess or shortfall of generated wind energy relative to load demand. In generator mode, the WPS supplements power when wind speeds are insufficient, while in motor mode, it stores excess energy by pumping water to an upper reservoir.

Intelligent Wind Power Generation Control System

Intelligent control of flywheel energy storage system ...

The paper concentrates on performance benefits of adding energy storage system with the wind generator in order to regulate the electric power ...

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Hybrid ANFIS-PI-Based Robust Control of Wind Turbine Power ...

This paper introduces a novel hybrid controller designed for a wind turbine power generation system (WTPGS) that utilizes a permanent magnet synchronous generator (PMSG).

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Intelligent control of the power generation system

Wind turbines are used in wind energy to convert the energy of the wind into mechanical power [11]. The electric generator comes next in the generation system after the turbine. The latter ...

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Hybrid ANFIS-PI-Based Robust Control of Wind Turbine Power

Generation

This paper introduces a novel hybrid controller designed for a wind turbine power generation system (WTPGS) that utilizes a permanent magnet synchronous generator (PMSG).

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Intelligent approach to maximum power point tracking control ...

In the variable-speed generation system, the wind turbine can be operated at the maximum power operating point for various wind speeds by adjusting the shaft speed. These ...

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Intelligent backstepping control of power grid-connected wind ...

This scholarly paper offers a wind power generation system (WPGS) that utilizes a configuration of parallel five-phase permanent magnet synchronous generators (PMSGs).

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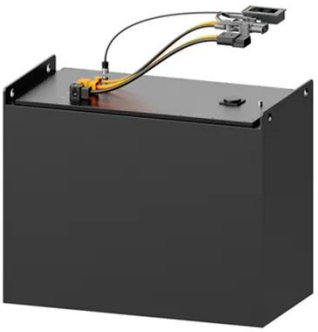

Intelligent control of a grid-connected wind-photovoltaic hybrid power

A high-performance on-line training radial basis function network-sliding mode (RBFNSM) algorithm is designed to

derive the turbine speed to extract maximum power from ...

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Control System of Wind Power Generation Based on Artificial

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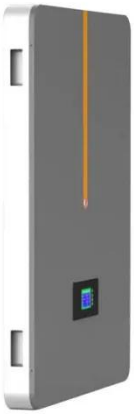

Intelligent Power System Frequency Regulations Concerning the

As the use of wind power turbines increases worldwide, there is a rising interest on their impacts on power system operation and control. Frequency regulation in interconnected networks is ...

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Innovative contributions: * Developed an autonomous model using intelligent control approaches. * Established a dynamic framework for a hybrid renewable energy system ...

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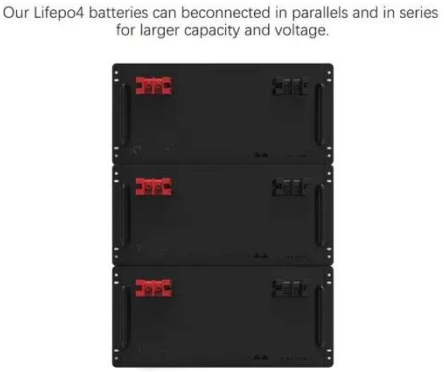

Adaptive optimal secure wind power generation control for ...

The performance of a wind turbine (WT) relies heavily on the control systems implemented on both the turbine side and the generator side. These systems

deal with highly ...

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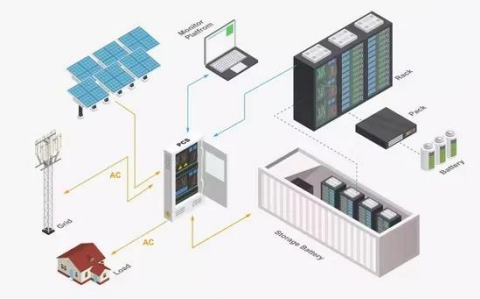

Intelligent backstepping control of power grid-connected wind ...

Abstract This scholarly paper offers a wind power generation system (WPGS) that utilizes a configuration of parallel five-phase permanent magnet synchronous generators (PMSGs). The ...

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Intelligent wind farm control via deep reinforcement learning ...

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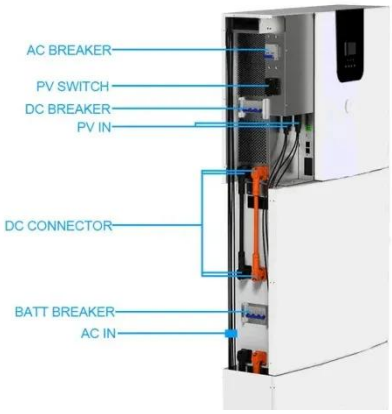

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