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# Direct-through wind power generation system control





## Overview

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Are direct drive generators a good choice for wind turbines?

The several studies presented by many authors prove that direct drive generators, especially DD-PMSG are the best choice for wind turbines. Indeed, authors in shows that the direct-drive technology ofers good performance with respect to reliability, maintenance, energy extraction, and grid power quality.

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.

How does a wind energy conversion system work?

As shown in Fig. 1, the wind energy conversion system under study includes a pumped water storage station, which plays a key role in managing the flow and storage of energy within the system. Firstly, the horizontal wind turbine converts the kinetic energy of the wind into mechanical energy available on the generator shaft.

Can we integrate energy storage systems into wind energy conversion systems?

For stand-alone wind systems, it is essential to ensure continuity of energy supply, particularly in remote areas where the energy infrastructure is minimal. To meet these challenges, the integration of energy storage systems into wind energy conversion systems (WECS) has been proposed as a solution.



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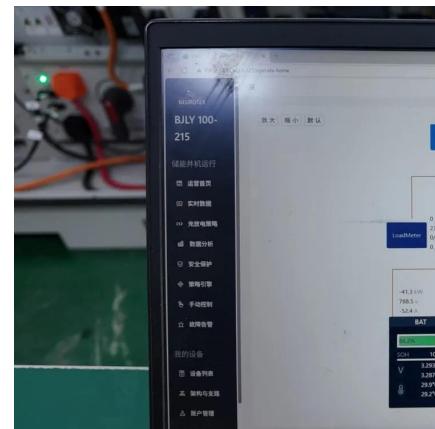


### [Analysis of Grid-Connected Wind Power Generation Systems ...](#)

Dec 14, 2024 · In this paper, a MATLAB/Simulink simulation program is used to construct a thorough simulation of a wind power generation system that includes the control strategy, ...

### [Direct Drive Permanent Magnet Synchronous Generator: ...](#)

In [4], the authors compared five different generator systems, namely doubly-fed induction with three stages (DFIG3G) and with single-stage gear-box (DFIG1G), permanent magnet ...



### [An overview of control techniques for wind turbine systems](#)

Nov 1, 2020 · This review paper presents a detailed review of the various operational control strategies of WTs, the stall control of WTs and the role of power electronics in wind system ...

### [Direct active and reactive powers control of double-powered](#)

Nov 1, 2023 · This work proposes a new nonlinear direct reactive and active power control (DRAPC) for grid-connected double-powered asynchronous generators (DPAGs) in multi-rotor ...



### [Research on Control Strategy of Direct-drive Permanent ...](#)

Dec 12, 2021 · Aiming at the problems of low power generation efficiency and large grid-connected current harmonics of the grid-side converter in the direct-drive permanent magnet

...

### **Control of a grid-connected direct-drive wind energy conversion system**

Jun 1, 2014 · This paper investigates the current control for a grid-connected direct-drive wind energy conversion system (DDWECS) with a permanent magnet synchronous generator ...



### **Comprehensive overview of grid interfaced wind energy generation systems**

May 1, 2016 · More than 200 research publications on the topic of grid interfaced wind power generation systems have been critically examined, classified and listed for quick reference. ...



### [Enhancement of the power quality of DFIG-based dual-rotor wind ...](#)

Mar 15, 2024 · This control is a combination between fractional-order control and fuzzy control to obtain a high robustness technique. This proposed control aimed to improve the effectiveness ...



### [Direct power control and back-stepping-based direct power control ...](#)

Aug 7, 2025 · The world wind power generation is developing towards offshore wind power generation system (WPGS) due to its huge wind energy reserves, which requires higher unit ...

### [Frequency regulation strategy of direct drive permanent ...](#)

Nov 23, 2023 · Direct-drive permanent magnet synchronous wind power generation systems can reserve spare power through pitch angle control and actively participate in system FR when ...



### [Grid-connected control of direct-driven permanent magnet wind ...](#)

To achieve safe and stable grid connection of the direct-driven permanent magnet wind power generation system, a grid-connection control strategy combining dual compensation droop ...



### Power control of an autonomous wind energy conversion system ...

Nov 30, 2024 · This makes the system a feasible solution for isolated, off-grid applications, contributing to advancements in renewable energy technologies and autonomous power ...



### Switching-angle-based hybrid modulation method of full wind ...

May 8, 2024 · Abstract A switching-angle-based hybrid modulation method of full wind speed and low carrier wave ratio for direct-drive permanent-magnet wind power generation system is ...



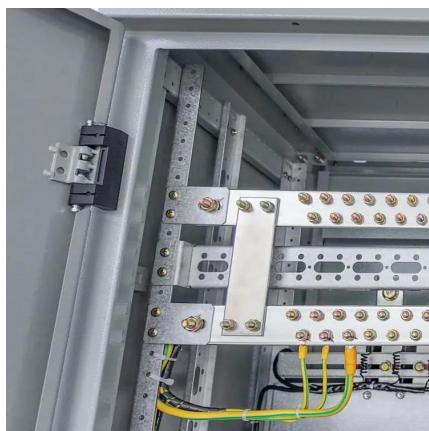
### A Control Strategy to Permanent Magnet Direct Drive ...

Dec 16, 2020 · Abstract As a kind of clean, renewable energy, wind energy is integrated into the integrated energy system is one of the effective measures to solve the continuous depletion of ...



## Wind power generation: A review and a research agenda

May 1, 2019 · The expansion of wind power generation requires a robust understanding of its variability and thus how to reduce uncertainties associated with wind power output. Technical ...



## Control Study of Direct-Drive Permanent Magnet Synchronous Wind Power

Mar 31, 2025 · Wind energy is the most promising renewable energy, and it plays a crucial role in sustainable development. This paper's research content is the converter control strategy of a ...

## Design of Variable Frequency Control System of Direct ...

Dec 1, 2021 · Research on low voltage ride-through of direct-drive variable-speed constant-frequency wind power generation system[J]. High-power converter technology, 2010(4): 28-31.



## Control of a PMSG based Wind Energy Generation System for Power

Jan 1, 2013 · A 2 MW PMSG variable speed wind power generation system is simulated to demonstrate the proposed control strategy during the grid fault. The control strategy can ...



### Wind power generation system and its wind alignment ...

Jun 1, 2025 · This study aimed to improve wind resource utilization efficiency and overcome the effects of wind fluctuation on wind power generation systems (WPGSs). A novel WPGS and a ...



### Research on Low-Voltage Ride-Through and ...

Dec 11, 2024 · This paper designs a hybrid wind power forecasting model based on CEEMDAN-CNN-Transformer-XGBoost for a permanent ...

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