

新能源与分布式发电

基于逆系统方法的双馈风力发电系统内模控制

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摘要: 针对双馈风力发电系统采用的基于近似线性化模型的分离控制方法存在系统动态性能差、抗扰能力弱等缺点, 从电力电子装置与电机系统集成的角度, 建立了双馈风力发电系统的统一模型, 应用逆系统原理将双馈风力发电系统进行精确线性化, 运用内模控制理论对其进行综合, 提出了双馈风力发电系统的逆系统内模控制策略, 实现了系统的非线性解耦控制。仿真结果表明, 该控制策略不仅提高了系统的鲁棒性, 还加快了系统的响应速度, 使系统具有良好的稳态和动态性能。

关键词: 双馈风力发电系统 统一模型 逆系统 内模控制 非线性控制

Internal Model Control of Doubly Fed Induction Generators Based on Inverse System Method

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Abstract:

In allusion to the defects of unsatisfactory dynamic performance and weak anti-interference ability existing in approximate linearization-based separation control method being adopted in doubly-fed wind power generation system, from the viewpoints of power electronic device and electrical motor system integration a unified model of doubly-fed wind power generation system is built and by use of the principle of inverse system the doubly-fed wind power generation system is accurately linearized and synthesized by internal model control (IMC) theory, and then an inverse system internal model control strategy for doubly-fed wind power generation system is proposed to implement nonlinear decoupling control of doubly-fed wind power generation system. Simulation results show that the proposed control strategy not only can enhance the robustness of control system, but also improve response speed of doubly-fed wind power generation system, thus the proposed control strategy makes doubly-fed wind power generation system possessing satisfactory steady state behavior and dynamic performance.

Keywords: doubly-fed wind power generation system; unified model inverse system internal model control nonlinear control

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