

电力电子与电力传动

分布式发电系统离网运行模式下输出电能质量控制技术

年珩, 曾嵘

浙江大学电气工程学院

摘要:

针对分布式发电系统离网运行模式下输出电能质量的需求, 以实现不平衡与非线性负载下系统输出稳定幅值和频率电压为控制目标, 提出了基于比例积分谐振(proportion integration resonance, PIR)的电压外环控制和预测电流控制(predictive current control, PCC)的电流内环控制的双闭环控制策略, 以解决传统的比例积分控制器由于带宽限制而引起离网运行下系统输出电压性能恶化的问题。在此基础上建立了基于永磁直驱风电机组的实验平台, 实验结果表明, 该控制方案可实现系统在不平衡与非线性负载下具有稳定的电压输出性能, 具备优良的负载动态适应能力, 可增强分布式发电系统在不平衡与非线性负载下的运行能力。

关键词: 分布式发电系统 离网运行 比例积分谐振控制 预测电流控制 负载适应能力

Control Technique on Output Power Quality for Distributed Generation System Under Stand-alone Operation Mode

NIAN Heng, ZENG Rong

College of Electrical Engineering, Zhejiang University

Abstract:

Aimed at the demand of the output power quality of the distributed generation system under the stand-alone operation mode, a dual-loop control strategy including proportion integration resonance (PIR) voltage control scheme and predictive current control (PCC) current control scheme was proposed to improve the magnitude and frequency stability of the output voltage under the unbalanced and the nonlinear load, which will be deteriorated with the traditional PI control scheme due to disadvantage of the low bandwidth. Associated control scheme for the distributed generation system based on a PMSG wind generation system was designed and constructed so as to confirm the feasibility of the PIR voltage controller and the PCC current controller. Experimental results show that the proposed strategy is capable of implementing system output voltage with stable amplitude and frequency under the unbalanced and the nonlinear load. As a result, the load-adaptive ability of the distributed generation system under the unbalanced and the nonlinear load is enhanced.

Keywords: distributed generation system stand-alone operation proportion integration resonance predictive current control load-adaptive ability

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通讯作者: 年珩

作者简介:

作者Email: nianheng@zju.edu.cn

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