

电力系统

基于广域信息的非线性全局综合控制器

于广亮¹;张保会¹;谢欢²;王立永³;李鹏^{4,3}

西安交通大学电气学院¹

河海大学电气工程学院²

天津大学电气与自动化工程学院, 天津³

收稿日期 2006-2-27 修回日期 网络版发布日期 2007-4-12 接受日期

摘要

随着同步相量测量单元(PMU)在电力系统中的广泛应用,开展基于广域测量系统(WAMS)的广域控制的研究具有重要的理论和实际意义。由于电力系统稳定问题本质上具有全局性,因此在电力系统的控制规律中引入广域信息可进一步改善系统的动态性能,提高系统承受大扰动的能力。该文采用全系统惯性中心坐标,以发电机转子角距离稳定平衡点最近为控制目标,以汽轮发电机组励磁电压与汽门为被控对象,应用非线性控制的逆系统理论分析了多机系统中励磁与汽门系统的可逆性,并设计了基于广域信息的非线性全局综合控制器,实现了“局部控制,服务全局”的控制策略。通过4机系统的数字仿真对比了该非线性全局综合控制器与常规PID控制器、非线性分散综合控制器的控制效果,结果表明,基于广域信息的非线性全局综合控制器更能减小系统的过渡时间、振荡次数及振荡幅度,更能增加系统的故障临界切除时间,增强系统的暂态稳定性。

关键词 [电力系统](#) [逆系统方法](#) [广域信息](#) [综合控制器](#)

分类号 [TM76](#)

A Nonlinear Global Integrated Controller Based on Wide-area Measurement Information

Abstract

With the wide application of synchronized phase measurement unit(PMU) in power system, the wide-area measurement system(WAMS) has enabled the use of a combination of measured signals from remote location for global control purpose. Since in nature power system stability is related to all generators, the introduction of wide-area information into nonlinear integrated control can improve the dynamic performance of power system and enhance power system stability. According to multivariable inverse system theory, this paper verifies the reversibility of excitation and turbine control system for a turbogenerator under the center of inertia reference frame(COI), and presents a novel nonlinear global integrated controller based on wide-area information including the on-line measured center of rotor angle and total unbalanced power. This controller regards the closest rotor angle to stable equilibrium point as control objective by modulating excitation voltage and turbine valve, and is considered as a "control the local to serve the global" controller. Digital simulation demonstrates that the four-machine system under the nonlinear global integrated control has less settling time, swing times, oscillatory peak value and more critical clear time and better transient stability performance than that under PID control or nonlinear decentralized integrated control.

Key words [power system](#) [inverse system method](#) [wide-area measurement information](#) [integrated controller](#)

DOI:

通讯作者 于广亮 Guanqliangyu@stu.xjtu.edu.cn

作者个人主页 于广亮 张保会 谢欢 王立永 李鹏

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(OKB\)](#)

▶ [\[HTML全文\]\(OKB\)](#)

▶ [参考文献\[PDF\]](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“电力系统”的 相关文章](#)

▶ 本文作者相关文章

• [于广亮](#)

• [张保会](#)

• [谢欢](#)

• [王立永](#)

• [李鹏](#)

•