

热工自动控制

部分分散控制及其在单元机组协调控制中的应用

楼冠男, 谭文

华北电力大学控制与计算机工程学院

摘要:

针对强耦合多变量对象控制系统设计中分散控制不能满足高性能要求, 而多变量先进控制算法结构复杂、较难推广的现象, 研究基于扩展对象的部分分散控制器设计。设计过程首先通过结构分析法得出部分分散控制器结构, 再对其对象进行非方扩展, 利用非方内模法设计相应非方分散控制器并转化为部分分散控制器, 最后应用扩展 m 交互法进行稳定性分析。将该方法应用于—500 MW单元机组协调控制系统的仿真研究, 结果表明: 部分分散控制系统能达到与多变量协调控制系统相近的性能, 并且部分分散控制结构更加简单、设计及调试方法更加容易。

关键词: 部分分散控制 扩展独立设计法 非方内模控制 扩展 m 交互法 单元机组协调控制系统

Partially Decentralized Control and Its Application in the Coordinated Control of Boiler-turbine Units

LOU Guannan, TAN Wen

School of Control & Computer Engineering, North China Electric Power University

Abstract:

A decentralized controller may not achieve desired performance for a strongly-coupled multivariable process; while advanced multivariable controllers are usually complex in structure and difficult to implement, so design of partially decentralized controllers under the condition of expansion procedure was studied. First, the structure of partially decentralized controllers was analyzed, and then an independent design method with the non-square internal model control (IMC) principle was applied to design non-square decentralized controllers which were transformed to partially decentralized ones. The stability of the closed-loop control system was guaranteed via expanded interaction m measure. The method was applied to a 500 MW boiler-turbine unit and the results show that partially decentralized controller can achieve comparable performance as the centralized one; moreover, it has a simpler structure and is easier to implement and tune.

Keywords: partially decentralized control expansion independent design method non-square internal model control expanded m interaction measure boiler-turbine units

收稿日期 2010-07-12 修回日期 2010-09-06 网络版发布日期 2011-01-27

DOI:

基金项目:

国家自然科学基金项目(60774012); 北京市自然科学基金项目(4092038)。

通讯作者: 楼冠男

作者简介:

作者Email: bingzhi0828@163.com

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