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热工自动控制

# 基于免疫优化的机炉协调系统模糊增益调度H∞鲁棒控制

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摘要： 针对非线性锅炉-汽轮机系统在负荷点大范围变动情况下的协调控制，提出了一种新的免疫优化模糊增益调度 鲁棒控制方法。该方法首先利用 /混合灵敏度方法设计出多个 局部鲁棒控制器以覆盖机炉系统的负荷变化区间；然后采用模糊推理生成增益调度准则以实现各局部控制器间的软切换；最后利用免疫遗传算法对模糊增益调度准则的结构参数进行优化设计，从而保证闭环系统具有良好的全局控制性能。仿真研究表明：基于该方法设计出的协调控制系统在大工况范围内具有优良的调节品质。

关键词： 机炉协调系统 H∞鲁棒控制 模糊推理 增益调度 免疫优化

## Fuzzy Gain Scheduled H∞ Robust Control for Boiler-turbine Coordinated System Based on Immune Optimization

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Abstract: A new fuzzy gain scheduled robust control method based on immune optimization is presented to control the nonlinear boiler-turbine coordinated system whose load operating points vary within wide range. Under this method multiple robust controllers were designed by using mixed sensitivity method at several load operating points that covered the whole load varying range of the boiler-turbine system. Then, the fuzzy inference system was adopted to create the gain scheduling law to switch the controllers softly and the parameters of the gain scheduling law were optimized by using immune genetic algorithm so as to obtain the best global closed-loop control performance. Simulation results show that the boiler-turbine coordinated system designed by the proposed method gives satisfactory regulation quality within wide operating range.

Keywords: boiler-turbine coordinated system H∞ robust control fuzzy inference gain scheduling immune optimization

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