

电力系统运行与规划

考虑电网N-1闭环安全校核的最优安全发电计划

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摘要:

提高发电计划的安全性和经济性是将短期发电计划应用于实际调度运行的关键。提出了将机组组合与电网线路N-1安全校核直接闭环的发电计划模式, 实现了考虑线路N-1闭环安全校核的机组组合全空间优化, 有效地提高了发电计划的安全性和经济性。基于该模式, 提出了主、子问题一体控制的最优奔德斯(Benders)分解方法, 确保了分解协调的最优性和高效性, 并且将起作用整数变量的识别方法嵌入主问题求解流程, 进一步提高了安全机组组合模型的求解效率, 为所提方法的实用化奠定了计算基础。理论分析和算例测试验证了所提最优闭环发电计划的最优性和高效性。

关键词: 安全约束机组组合 N-1 奔德斯分解法 起作用整数变量

Optimal Security Constrained Generation Scheduling Considering Closed-loop N-1 Security Correction

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Abstract:

The key to implement short term generation scheduling in practice is to improve its security and economic performances. A novel closed-loop security constrained unit commitment (SCUC) framework was proposed to acquire the global optimal solution by integrating N-1 security check in the unit commitment directly, and this effectively improve the security and economic performances of generation scheduling. With this framework, an optimal decomposition method based on Benders decomposition was proposed. This method can improve the computation efficiency in the premise of guaranteeing the optimization precision by optimizing control variables of master and sub problems synchronously. We also integrated the identification method of active integer variables in the solution procedure of the master problem to accelerate the computation further. The effectiveness of our method was validated by theoretical analysis and numerical experiments.

Keywords: security constrained unit commitment (SCUC) N-1 Benders decomposition active integer variable

收稿日期 2010-11-08 修回日期 2010-12-16 网络版发布日期 2011-04-11

DOI:

基金项目:

国家自然科学基金项目(50877041); 新世纪优秀人才支持计划项目(NCET-07-0484)。

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