

## 电力系统

### 电能质量综合补偿器的稳定性及电流控制特性分析

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#### 摘要:

对电能质量综合补偿器的稳定性及电流控制的稳态误差特性进行了分析。首先, 根据系统的等效电路图导出系统的结构图, 求得系统对应的传递函数, 证明系统为一个结构稳定的系统, 根据Routh判据给出了系统稳定的充要条件。其次, 对广义积分迭代控制算法在谐波电流抑制应用中的稳态误差特性进行了分析, 数学推导证明广义积分控制器可以实现对谐波电流的完全跟踪, 克服了常规比例积分控制的有差特性。仿真结果说明了所提综合补偿系统结构的可行性, 也验证了系统的稳定性及其稳态无差特性分析的正确性。

**关键词:** 综合补偿器 有源滤波器 稳定性 稳态误差 广义积分控制

### Analysis on Stability and Current Control Performance of Power Quality Combined Compensator

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#### Abstract:

The Stability of power quality combined compensator and the steady state error performance are analyzed. Firstly, based on equivalent circuit diagram the structural diagram of power quality combined compensator is deduced to attain corresponding transfer function of the system, and then according to Routh criterion the necessary and sufficient conditions for stability of the system are given to prove this system is structurally stable; secondly, the steady state error performance of applying generalized integral iteration control algorithm in harmonic current suppression is analyzed, and it is proved by mathematical derivation that the generalized integral controller can perfectly trace harmonic currents, thus the error performance of the traditional PI controller is surmounted. PSIM simulation results show that the structure of the proposed combined system is feasible, and the stability of the proposed system as well as the correctness of the analysis on its steady state error performance are verified.

**Keywords:** combined compensator active power filter stability steady state error improper integral control

收稿日期 2010-07-19 修回日期 2010-12-13 网络版发布日期 2011-09-13

DOI:

#### 基金项目:

国家自然科学基金项目(50907017)。

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