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分数阶PID控制器用于STATCOM控制研究

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摘要：分数阶PID（FOPID）控制器是一种微分阶与积分阶是分数的PID控制器，其设计关键在于如何设定FOPID的5个重要控制参数。文章采用遗传粒子群优化（GAPSO）算法来设计FOPID控制器，并定义了一种新的代价函数以便在整个时域范围内加快控制参数的搜索过程。与常规PID控制器的仿真对比表明：在模型不确定时，所设计的FOPID控制器能大大提高控制系统的鲁棒性。

关键词：遗传粒子群优化（GAPSO）；FOPID；鲁棒性；静止同步补偿器；电力系统

Study of Fractional Order PID Controllers for STATCOM

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Abstract: The Fractional Order PID (FOPID) controller is a kind of PID with fractional derivative and integral orders. The key issues of FOPID controller design are how to determine the five important parameters of the controler. The Genetic Algorithm Particle Swarm Optimization (GAPSO) algorithm is employed to design a FOPID controller, and a novel cost function is defined to facilitate the control strategy over the time-domain specifications. Simulation results show that the proposed FOPID controller can enhance the system robustness obviously in comparison with usual PID under the condition of model uncertainties.

Key words: GAPSO; FOPID; robustness; STATCOM; power system

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