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论文

补偿配电网电压不平衡的静止同步补偿器控制方法研究

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摘要:

将静止同步补偿器(static synchronous compensator，STATCOM)经电感电容(inductor-capacitor，LC)滤波器滤波后并入电网来调整和平衡配电网电压，通过对电网电压不平衡条件下STATCOM的负序等效电路分析，提出一种新的正、负序电压双环叠加控制策略。正序电压控制环控制公共连接点电压为给定值，负序电压控制环实现公共连接点电压三相对称控制。新控制策略基于瞬时功率平衡思想，采用神经元自适应算法来整定比例积分微分(proportional-integral-derivative，PID)控制参数，具有成本低、鲁棒性好等特点，可在电网电压不平衡时有效地调节和平衡配电网电压。仿真和实验结果表明该方法的有效性。

关键词： 静止同步补偿器 电压不平衡 功率平衡 自适应

Research on Control Method of STATCOM for Grid Voltage Unbalance Compensation

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Abstract:

According to analyzing the negative equivalent circuit of the static synchronous compensator (STATCOM) in unbalanced distribution networks, a new cascade loop control strategy to regulate and balance the voltage at a distribution bus using a STATCOM device was proposed, based on a SPWM controlled voltage source inverter (VSI) connected to the distribution network through a inductor-capacitor (LC) filter. The proposed control strategy based on instantaneous power balancing algorithm and in which a negative sequence voltage control loop was introduced in parallel to the positive sequence voltage loop. The positive sequence voltage loop was used to regulate the voltage, while the negative sequence voltage control loop was used to balance the voltage. Besides，in order to gain a good control effect for the nonlinear and time-variant system,the neuron self-adaptive technology was used to adjust proportional-integral-derivative (PID) parameters. Simulation and experimental results were presented to verify the validity of the proposed control strategy.

Keywords: static synchronous compensator voltage unbalance power balance self-adaptive

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