论文

动态电压恢复器的最优控制和最优滤波

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摘要：

提出基于最优控制和最优滤波的动态电压恢复器控制策略。该控制方法用Sage-Husa卡尔曼滤波器对动态电压的暂降进行检测，同时实现对三相电网电压的锁相功能。该算法实现了在谐波和不平衡条件下正序电压幅值和相位几乎无延时的检测。为加快系统动态响应速度，提出最优控制的策略；同时设计一个最优滤波器——降维卡尔曼滤波器进行电流状态量的观测。降维卡尔曼滤波器的使用不但节省了3个电流传感器，而且加快了控制的响应速度，从而显著提高了不平衡暂降的补偿能力。实验结果证明该文所提出的控制策略的有效性。

关键词： 动态电压恢复器   最优控制   最优滤波

An Optimal Control Strategy for Dynamic Voltage Restorer With an Optimal Filter

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Abstract:

A control strategy based on optimal control and optimal filter for dynamic voltage restorer (DVR) was proposed. A Sage-Husa Kalman filter was used to detect voltage sag and was used as a three-phase digital phase lock loop simultaneously. The proposed Sage-Husa Kalman filter based algorithm can detect the magnitude and phase angle of the fundamental- frequency positive-sequence component of the source voltage instantaneously under unbalanced and distorted conditions. In order to improve transient response, an optimal control strategy was proposed, and an optimal filter: reduced dimension Kalman filter was further proposed to observe the deviation term of filter currents used in the controller. The usage of the reduced dimension Kalman filter has not only saved three current sensors, but also enhance the control dynamics with its inherent one step prediction ability, thus the unbalanced sag mitigation ability is greatly enhanced. Experimental results verify the effectiveness of the proposed control strategy.

Keywords: dynamic voltage restorer   optimal control   optimal filter

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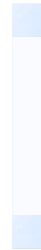
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