

电力系统

模块化并联型低压有源电力滤波装置的设计与工程应用

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摘要

为滤除低压电网非线性负载产生的谐波, 设计了模块化并联型低压有源滤波装置。在设计方案中, 主电路采用三相3桥臂结构的3电平二极管箝位变流器, 并设有软启动、直流侧稳压控制以及二级过压过流保护功能, 控制电路采用数字模拟混合电路技术。针对国内工业用户的特点, 在电容器回路中串联了特定电抗率的电感, 给出了电容与有源滤波装置混合补偿结构。实验结果表明, 该装置不但可有效抑制未被放大的谐波, 且可使母线电流总畸变率从原来的39.4%降至6%以下, 使母线电压畸变率从投运前的10.1%降至3.0%以下, 使功率因数从0.58升至0.92以上, 验证了该装置的有效性和应用价值。

关键词 [模块化; 并联型; 低压有源滤波装置; 混合补偿; 谐波畸变率; 功率因数](#)

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Design and Engineering Practice of Modularized Shunt Active Power Filter for Low Voltage Power Network

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Abstract

To eliminate the harmonics caused by nonlinear loads in power network, a modularized active power filter (APF) for low voltage power network is designed. In the design scheme of the main circuit, three-level diode clamping converter with the structure of three-phase three-arms is adopted, and the functions such as soft start, voltage stabilizing control at DC side and two-stage over-voltage and over-current protection are equipped; the digital-analogue hybrid circuit is adopted in the control. According to the features of domestic industrial consumers, capacitor circuit of this APF is in series with specific inductor, and a hybrid compensations structure of capacitor and active filter is given. Experimental results show that the proposed device not only can eliminate the harmonics that have not been amplified effectively, but also the total distortion rate of bus current can be depressed from its original value of 39.4% to less than 6%, and the distortion rate of bus voltage from 10.1% before putting into operation of the low voltage shunt APF to less than 3.0%, as well as power factor is improved from original value of 0.58 to more than 0.92, thus the effectiveness and application value of the proposed low voltage shunt APF are validated.

Key words [modularized; in shunt; low voltage active power filter; hybrid compensation; harmonic distortion rate; power factor](#)

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