



三相不平衡系统谐波传输特性及其抑制
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摘要: 以Yd11牵引变压器为例分析了不平衡电力系统多谐波源的传输特性, 测试4种不同负载接入方式以揭示多谐波源之间的相互作用。采用4种不同的单相无源滤波器接入方案来补偿不平衡的谐波成分, 得出当无源滤波器与非线性负载位于相同变电所同一相时具有最好的滤波效果, 滤波后系统电流总谐波畸变率平均为4.2%, 当滤波器与非线性负载位于不同变电所, 在相同相时具有较好的滤波效果, 补偿后系统电流总谐波畸变率平均为5.3%, 但在不同相时会不同程度地放大谐波。

关键词: 不平衡系统; 谐波传输特性; 谐波抑制; 总谐波畸变率

Harmonic Transmission Characteristic and Suppression
of Unbalanced Power System

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Abstract: The characteristics of multi-harmonic sources in unbalanced power system are analyzed with the Yd11 traction transformer of electrified railway as an example, and four types of connection mode were tested to illustrate the interaction among multi-harmonic sources. Four passive power filter schemes are adopted to compensate the unbalanced harmonic component, showing that the scheme with the power filter and the non-linear load being in the same substation and having the same phase has the best filtering effect as the total harmonic distortion of system current reducing to 4.2% averagely, and that with the filter and the non-linear load having the same phase but being in different substations has a good filtering effect as the total harmonic distortion of filtered current reducing to about 5.3%. Meanwhile, the schemes with the filter and the non-linear load having different phases enlarge somehow the harmonic content of specific phase.

Key words: unbalanced power system; harmonic transmission characteristics; harmonic suppression; total harmonic distortion

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