

电力系统

基于频变特性的变压器谐波损耗分析

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摘要:

工业变频设备和高频装置的广泛应用导致电力系统谐波污染加剧, 致使非线性负荷下的变压器损耗计算与分析备受关注。研究了谐波等值模型, 修正了传统曲线拟合谐波损耗计算法, 从涡流场角度分析模型准静态磁场中不同材料的磁扩散情况, 归纳出其谐波频变特性。同时, 考虑不同频率谐波下绕组的等效非线性参数和谐波损耗叠加计算, 对谐波损耗进行修正。搭建了变频调速系统模型, 通过各种方法的对比, 验证了上述方法的正确性和有效性。

关键词: 等效参数 电磁分析 频变特性 谐波损耗

Harmonic Loss Analysis of Transformer Based on Frequency Dependent Characteristics

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Abstract:

The widespread applications of industrial frequency conversion equipments and high frequency equipments exacerbate the harmonic pollution in power systems, thus special attentions are paid to the analysis and calculation of transformer loss under nonlinear load. On the basis of analyzing equivalent harmonic model of transformer the traditional curve fitting-based harmonic loss calculation method is modified, and in the viewpoint of eddy current field the magnetic diffusion in different materials in quasi-static magnetic field is researched and their harmonic frequency dependent characteristics are induced. Considering equivalent nonlinear parameters of transformer windings under different harmonic frequencies and the superposition of harmonic losses, the harmonic loss is modified. Both comparison results of various calculation methods and simulation results of a constructed model of frequency-variable speed control system verify the effectiveness and correctness of the proposed calculation method.

Keywords: equivalent parameters electromagnetic analysis frequency dependent characteristics harmonic losses

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