电机电工

耦合电磁干扰问题的新型数值方法研究

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摘要
针对电磁部件间和外部放射源产生的非线性耦合电磁干扰问题，应用模式综合策略，提出了新型的改进最小均方二乘方法。该方法与矩量法相结合，实现了近距干扰时变情形下被测信号幅值、相位的精确计算，有效抑制了由非线性耦合干扰引起的检测误差。模式综合策略对电磁部件间的互耦干扰和外部放射源产生的耦合干扰进行整合分析，利用加权矩阵表征期望幅值、相角、频率等关键性能参数的函数，令该方法具有形式简单、计算精确、存储量小、鲁棒性好的特点。基于dSPACE的实验结果证明了该方法的正确性和有效性。

关键词　　最小二乘方法　矩量法　电磁兼容　模式综合

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Study on Novel Numerical Analysis of Coupling Electromagnetic Inference

Abstract
The main purpose of this paper is to develop a numerical optimization algorithm with pattern synthesis technique that takes account of nonlinear mutual coupling electromagnetic interference among inner elements and interactions with outside scatterers. To achieve this, a modified linear least squares method(LLM) is proposed. The novel LLM is combined with moments-based scheme to optimize the radiation pattern of arbitrary arrays in the operational environment, and eliminate the array amplitude and phase tracking error caused by electromagnetic interference. In this method, the mutual coupling interference and other effects, such as the presence of nearby scatterers, are incorporated into the analysis with pattern synthesis technology, and a weighted matrix is used to formulate specific performance parameters as a function of expected amplitude, phase or frequency. The proposed method leads to a simple control structure and accurate calculation results, reduces the storage requirement and enhances the robustness of the electrical system. The reasonability and validity is testified by the experimental results based on dSPACE.

Key words　　least squares method　method of moment　electromagnetism conpatble pattern synthesis

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