论文

高速印刷电路板间垂直通孔的建模与分析

任志军, 孙玉发

安徽大学计算智能与信号处理教育部重点实验室 合肥 230039

摘要
通孔是现代高速印刷电路板中最常用的互连结构之一，其在传输信号特别是高速信号时会带来一系列信号完整性问题，因此对其进行准确、快速、有效的电磁建模与仿真将变得极为重要。该文使用一种基于Foldy-Lax方程的全波分析法并结合网络级联理论对其进行电磁建模。在单层垂直通孔结构中，建立柱体通孔间的Foldy-Lax多径散射方程，求得柱体通孔的激励场系数，计算出单层垂直通孔的散射矩阵，再应用多端口网络级联理论便可得到多层垂直通孔的散射矩阵。最后给出了四层垂直通孔散射参数的计算结果，并与已有文献结果进行了比较，两者吻合良好，从而验证了该方法的有效性。

关键词　通孔　垂直通孔　Foldy-Lax方程　多径散射　网络级联

分类号　TN41　O441

Modeling and Analysis of Vertical Vias in High Speed Printed Circuit Board

Ren Zhi-jun, Sun Yu-fa

Key Lab. of Intelligent Computing & Signal Processing, Ministry Education, Anhui University, Hefei 230039, China

Abstract
Vias are one of the most common interconnection structures used in modern high speed Printed Circuit Board (PCB), which would induce a series of problems such as loss of signal integrity when transmitting signal especially high speed signal. So it is very important that vias are modeled and simulated accurately, speedily, efficiently. The network cascade theory combined with a semi-analytical full wave approach based on Foldy-Lax equation is used to model vias in this paper. In single-layer vertical vias, the Fold-Lax equations of multiple scattering among the cylindrical vias are given. The exciting field coefficients of cylindrical vias are solved. The scattering matrix of coupling among single-layer vias is calculated. By multi-port network cascade theory, the scattering matrix of coupling among multi-layer vertical vias is obtained. The results of scattering matrix are given for 4-layer vertical vias, which show that the method presented in this paper is correct and valid.

Key words　Vias　Vertical vias　Foldy-Lax equation　Multiple scattering　Network cascade

DOI :

通讯作者

作者个人主页　　任志军; 孙玉发

扩展功能

本文信息

- Supporting info
- PDF(306KB)
- [HTML全文](0KB)
- 参考文献[PDF]
- 参考文献

服务与反馈

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- 复制索引
- Email Alert
- 文章反馈
- 浏览反馈信息

相关信息

- 本刊中 包含"通孔"的 相关文章

本文作者相关文章

- 任志军
- 孙玉发