Abstracts

A sparse-matrix/canonical grid method for analyzing densely packed interconnects

S.-Q. Li, Y. Yu, C.H. Chan, K.F. Chan and L. Tsang. "A sparse-matrix/canonical grid method for analyzing densely packed interconnects." 2001 Transactions on Microwave Theory and Techniques 49.7 (Jul. 2001 [T-MTT]): 1221-1228.

In this paper, a fast numerical method called the sparse-matrix/canonical-grid (SM/CG) method is employed to analyze densely packed microstrip interconnects that involve a large number of unknowns. The mixed-potential integral equation is solved by using the method of moments in the spatial domain. The closed-form expressions of the spatial Green's functions of microstrip structures are obtained from the combination of the fast Hankel transform and the matrix pencil method. The Rao-Wilton-Glisson triangular basis functions are used to convert the integral equation into a matrix equation. The matrix equation is then solved by using the SM/CG method, in which the far-interaction portion of the matrix-vector multiplication in the iterative solution is performed by the fast Fourier transforms (FFTs). This is achieved by the Taylor series expansions of the spatial Green's functions about the uniformly spaced canonical grid points overlaying the triangular discretization. Numerical examples are presented to illustrate the accuracy and efficiency of the proposed method. The SM/CG method has computational complexity of O(NlogN). Furthermore, being FFT-based facilitates the implementation for parallel computation.

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