Abstracts

Thin-stratified medium fast-multipole algorithm for solving microstrip structures

Jun-Sheng Zhao, Weng Cho Chew, Cai-Cheng Lu, E. Michielssen and Jiming Song. "Thin-stratified medium fast-multipole algorithm for solving microstrip structures." 1998 Transactions on Microwave Theory and Techniques 46.4 (Apr. 1998 [T-MTT]): 395-403.

An accurate and efficient technique called the thin-stratified medium fast-multipole algorithm (TSM-FMA) is presented for solving integral equations pertinent to electromagnetic analysis of microstrip structures, which consists of the full-wave analysis method and the application of the multilevel fast multipole algorithm (MLFMA) to thin stratified structures. In this approach, a new form of the electric-field spatial-domain Green's function is developed in a symmetrical form which simplifies the discretization of the integral equation using the method of moments (MoM). The patch may be of arbitrary shape since their equivalent electric currents are modeled with subdomain triangular patch basis functions. TSM-FMA is introduced to speed up the matrix-vector multiplication which constitutes the major computational cost in the application of the conjugate gradient (CG) method. TSM-FMA reduces the central processing unit (CPU) time per iteration to O(N log N) for sparse structures and to O(N) for dense structures, from O(N/sup 3/) for the Gaussian elimination method and O(N/sup 2/) per iteration for the CG method. The memory requirement for TSM-FMA also scales as O(N log N) for sparse structures and as O(N) for dense structures. Therefore, this approach is suitable for solving large-scale problems on a small computer.

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