Abstracts

Application of the SSOR preconditioned CG algorithm to the vector FEM for 3D full-wave analysis of electromagnetic-field boundary-value problems

Ru-Shan Chen, Edward Kai-Ning Yung, C.H. Chan, Dao Xiang Wang and Da Gang Fang. "Application of the SSOR preconditioned CG algorithm to the vector FEM for 3D full-wave analysis of electromagnetic-field boundary-value problems." 2002 Transactions on Microwave Theory and Techniques 50.4 (Apr. 2002 [T-MTT]): 1165-1172.

The symmetric successive overrelaxation (SSOR) preconditioning scheme is applied to the conjugate-gradient (CG) method for solving a large system of linear equations resulting from the use of edge-based finite-element method (FEM). For this scheme, there is no additional computing time required to construct the preconditioning matrix and it contains more global information of the coefficient matrix when compared with those of the banded-matrix preconditioning scheme. The efficient implementation of this preconditioned CG (PCG) algorithm is described in details for complex coefficient matrix. With SSOR as the preconditioner and its efficient implementation in the CG algorithm, this PCG approach can reach convergence in five times CPU time shorter than CG for several typical structures. By comparison with other preconditioned techniques, these results demonstrate that SSOR preconditioning strategy is especially effective for CG iterative method when an edge FEM is applied to solve large-scale time-harmonic electromagnetic-field problems.

❑ Return to main document.