Abstracts

Simple and efficient computation of electromagnetic fields in arbitrarily shaped inhomogeneous dielectric bodies using transpose-free QMR and FFT

C.F. Wang and J.M. Jin. "Simple and efficient computation of electromagnetic fields in arbitrarily shaped inhomogeneous dielectric bodies using transpose-free QMR and FFT." 1998 Transactions on Microwave Theory and Techniques 46.5 (May 1998, Part I [T-MTT]): 553-558.

A simple and efficient numerical method is presented for computing electromagnetic fields in three-dimensional (3-D) inhomogeneous-dielectric bodies. The method employs a two-stage discretization to convert an integro-differential equation into an implicit system of linear algebraic equations. This discrete system is then solved using a transpose-free quasi-minimal residual (TFQMR) algorithm, which avoids the calculation of the multiplication between the transpose of the system matrix and a vector. The simple multiplication between the system matrix and a vector required in the TFQMR algorithm is calculated efficiently using only six fast Fourier transforms (FFTs). Numerical results for strongly inhomogeneous and lossy spheres show that the method has a stable convergence behavior and excellent numerical performance.

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