

Abstracts

An Efficient Finite Element Solution of Inhomogeneous Anisotropic and Lossy Dielectric Waveguides

Y. Lu and F.A. Fernandez. "An Efficient Finite Element Solution of Inhomogeneous Anisotropic and Lossy Dielectric Waveguides." 1993 Transactions on Microwave Theory and Techniques 41.6 (Jun./Jul. 1993 [T-MTT]): 1215-1223.

An efficient finite element method is presented for the full wave analysis of dielectric waveguides. This method has four major features: 1) the ability to treat a wide range of dielectric waveguide problems with arbitrarily shaped cross section, inhomogeneity, transverse-anisotropy, and significant loss (or gain); 2) total elimination of spurious solutions; 3) direct solution for the (complex) propagation constant at a specified frequency; and 4) the use of only two components of the magnetic field, thus maximizing the numerical efficiency of solution. The resultant matrix eigenvalue problem is of canonical form and is solved with an efficient method, specially developed for this purpose, taking full advantage of the sparsity of the matrices. Numerical results are shown for a variety of microwave and optical waveguides including anisotropy and losses. These examples also include closed and open-bounded structures. The computational results agree very well with analytical and previously published results.

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