Abstracts

Full-Wave Analysis of Dielectric Waveguides Using Tangential Vector Finite Elements

J.-F. Lee, D.-K. Sun and Z.J. Cendes. "Full-Wave Analysis of Dielectric Waveguides Using Tangential Vector Finite Elements." 1991 Transactions on Microwave Theory and Techniques 39.8 (Aug. 1991 [T-MTT]): 1262-1271.

A new method is presented for the analysis of dielectric waveguides. This method provides four major new contributions: 1) a transformation of variables is introduced that allows propagation constants to be computed directly; 2) H/sub 1/(curl) tangential vector finite elements are applied to dielectric waveguides to obtain reliable approximate electromagnetic fields; 3) the Lanczos algorithm is modified to solve the required generalized eigenmatrix equation efficiently; and 4) the reaction principle is used to provide a posteriori error estimates for use in adaptive mesh refinement. The method described here produces reliable solutions and applies to structures that contain both electric and magnetic inhomogeneities. The answers are refined adaptively to generate waveguide eigenmodes to specified accuracy. Numerical results of an image guide, a microstrip transmission line, and a pedestal-supported stripline are shown. Computed solutions agree very well with the previously published results.

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