Abstracts

An Efficient Finite Element Method for Nonconvex Waveguide Based on Hermitian Polynomials

M. Israel and R. Miniowitz. "An Efficient Finite Element Method for Nonconvex Waveguide Based on Hermitian Polynomials." 1987 Transactions on Microwave Theory and Techniques 35.11 (Nov. 1987 [T-MTT]): 1019-1026.

An efficient finite element method (FEM.) in waveguide analysis is described. The method rises Hermitian polynomials to interpolate the field compohent (E/sub z/ or H/sub z/) and some of its derivatives at the nodal points, rather than the field components, as in the Lagrangian interpolation case. Element matrices, for a standard triangle, are given for third- and fifth-degree Hermitian polynomials. The appropriate transformations that relate the element matrices of a general triangle to the standard triangle element have been derived. Compared to the broadly used Lagrangian interpolation FEM, the Hermitian FEM has the following advantages 1) a significant reduction of the matrix order needed to compute the eigenvalues and eigenfunction; 2) smooth axial components (E/sub z/ or H/sub z/) and continuous transverse field components; 3) low-cost refinement of the mesh near nonconvex corners of the waveguide. These advantages are illustrated by comparing the FEM, with Hermitian polynomials solution, to other solutions for rectangular and ridged waveguides.

❑ Return to main document.