Abstracts

Efficient hybrid mode-matching/-finite-element (MM/FE) method for the design of waveguide components and slot radiators

R. Beyer and F. Arndt. "Efficient hybrid mode-matching/-finite-element (MM/FE) method for the design of waveguide components and slot radiators." 1998 MTT-S International Microwave Symposium Digest 98.3 (1998 Vol. III [MWSYM]): 1275-1278.

A hybrid mode-matching/finite-element (MM/FE) method is introduced for the rigorous design and optimization of waveguide components and radiators of arbitrary cross-section. The FE formulation for general cylindrical and conical waveguides, respectively, leads to a fast and direct sparse matrix eigenvalue procedure. Based on the MM technique in combination with a spherical wave expansion for the free space, a system of equations of low order for the coefficients of incident and scattered waves in the feeding waveguide is obtained by which the generalized scattering matrix as well as near- and far-field patterns can be calculated. The hybrid method combines advantageously the flexibility of the FE method with the efficiency of the MM technique. Its versatility is demonstrated at the optimum design of a septum polarizer which is directly combined with a conical circular waveguide horn, and the optimization of a slot-array element. The theory is verified by measurements.

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