Abstracts

Waves and Evanescent Fields in Rectangular Waveguides Filled with a Transversely Inhomogeneous Dielectric

W. Baier. "Waves and Evanescent Fields in Rectangular Waveguides Filled with a Transversely Inhomogeneous Dielectric." 1970 Transactions on Microwave Theory and Techniques 18.10 (Oct. 1970 [T-MTT]): 696-705.

A numerical-calculation method for rectangular waveguides containing a transversely inhomogeneous dielectric is presented. The method is not restricted to the cutoff case or to special inhomogeneities. The relative permittivity of the dielectric can be an arbitrary function of the cross-sectional coordinates. The electric-and magnetic-field strengths, the dispersion characteristics of the propagating modes, and the attenuation constants of the evanescent modes result from the solution of a matrix eigenvalue problem with typically 8000 matrix elements. Propagating and evanescent modes in a waveguide containing a longitudinal semicircular dielectric rod are calculated as examples. The accuracy of the calculation method is confirmed by measurements and by calculating a special example with an exactly known solution. The error of the field intensities is typically 5 percent; the error of the dispersion characteristics and of the attenuation constants is typically 0.5 percent.

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