Abstracts

Finite-Difference Method without Spurious Solutions for the Hybrid-Mode Analysis of Diffused Channel Waveguides

N. Schulz, K. Bierwirth, F. Arndt and U. Koster. "Finite-Difference Method without Spurious Solutions for the Hybrid-Mode Analysis of Diffused Channel Waveguides." 1990 Transactions on Microwave Theory and Techniques 38.6 (Jun. 1990 [T-MTT]): 722-729.

Diffused dielectric channel waveguides with an arbitrarily varying refractive index profile in the cross-sectional plane are analyzed with a rigorous finite-difference method formulated in terms of the wave equation for the transverse components of the magnetic field. This leads to an eigenvalue problem where the nonphysical, spurious modes do not appear. The analysis includes the complete set of hybrid modes, takes mode-conversion effects and complex waves into account, and allows the immediate inclusion of large index difference levels as well as the two-dimensional continuously varying index profile function without the usual staircase approximation. By way of example, dispersion characteristics are calculated for structures suitable for millimeter-wave and optical integrated circuits, such as channel waveguides with refractive index variations having stepped, linear, Gaussian, and exponential function profiles. The theory is verified by comparison with results available from other rigorous methods.

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