Abstracts

Finite-Difference Analysis of Rectangular Dielectric Waveguide Structures

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A class of dielectric waveguide structures using a rectangular dielectric strip in conjunction with one or more layered dielectrics is analyzed with a finite-difference method formulated directly 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. Moreover, the analysis inclndes hybrid-mode conversion effects, such as complex waves, at frequencies where the modes are not yet completely bound to the core of the highest dielectric constant, as well as at frequencies below cutoff. Dispersion characteristic examples are calculated for structures suitable for millimeter-wave and optical integrated circuits, such as dielectric image lines, shielded dielectric waveguides, insulated image guides, ridge guides, and inverted strip, channel, strip-slab, and indiffused inverted ridge guides. The numerical examples are verified by results available from other methods.

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