Abstracts

Domain Integral Equation Analysis of Integrated Optical Channel and Ridge Waveguides in Stratified Media

E.W. Kolk, N.H.G. Baken and H. Blok. "Domain Integral Equation Analysis of Integrated Optical Channel and Ridge Waveguides in Stratified Media." 1990 Transactions on Microwave Theory and Techniques 38.1 (Jan. 1990 [T-MTT]): 78-85.

A domain integral equation approach has been developed to compute both propagation constants and corresponding electromagnetic field distributions of guided waves in an integrated optical waveguide. The waveguide is embedded in a stratified medium. The refractive index of the waveguide may be graded, but the refractive indices of the layers of the stratified medium are assumed to be piecewise homogeneous. The waveguide is regarded as a perturbation of its embedding, so the electric field strength can be expressed in terms of a domain integral representation. The kernel of this integral consists of a dyadic Green's function which is constructed using an operator approach. By investigating the electric field strength within the waveguide, an integral equation can be derived which represents an eigenvalue problem which is solved nomerically by applying the method of moments. The application of the domain integral equation approach in combination with a numerically stable evaluation of the Green's kernel functions provides a new and valuable tool for the characterization of integrated optical waveguides embedded in stratified media. Numerical results are presented for various channel and ridge waveguides and are compared with those of other methods where possible.

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