Abstracts

A Combined Method for Dielectric Waveguides Using the Finite-Element Technique and the Surface Integral Equations Method

A combined method employing a finite-element technique in the H_x - H_y formulation and the surface integral equations method is proposed to treat the propagation characteristics of inhomogeneous waveguides with single or multiple claddings. The significant features of this combined method are that it does not suffer from any kind of spurious modes, which have been troublesome in applying the finite-element technique to waveguides and it is also capable of treating the cutoff frequencies of arbitrarily shaped, inhomogeneous dielectric waveguides with a single cladding, which is perhaps original. Furthermore, the proposed method is convenient in treating propagation constants close to cutoff and in handling coupled waveguides. Numerical results of inhomogeneous elliptical waveguides, diffusion waveguides, and the corresponding directional couplers are presented, including the cutoff frequencies of the elliptical waveguides.

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