Abstracts

Guidance and Leakage Properties of a Class of Open Dielectric Waveguides: Part I--Mathematical Formulations

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A class of open dielectric waveguides is discussed which is of direct importance to the areas of integrated optics and millimeter-wave integrated circuits. An accurate analysis of the properties of these waveguides reveals that interesting new physical phenomena, such as leakage and sharp cancellation or resonance effects, may occur under appropriate circumstances. The resulting leaky modes form a new class of such modes since the leakage, in the form of an exiting surface wave, has a polarization opposite to that which dominates in the bound portion of the leaky mode. These new effects are caused by TE-TM mode coupling, which was neglected in earlier approximate treatments. Part I presents the mathematical formulation based on a rigorous mode-matching procedure.

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