Abstracts

EM-Wave Propagation through Semi-Elliptic Cylindrical Dielectric Waveguide on a Perfectly Conductive Planar Substrate

A.C. Perdikouris, D.P. Chrissoulidis and E.E. Kriezis. "EM-Wave Propagation through Semi-Elliptic Cylindrical Dielectric Waveguide on a Perfectly Conductive Planar Substrate." 1994 Transactions on Microwave Theory and Techniques 42.5 (May 1994 [T-MTT]): 891-898.

This is a theoretical study of modes in a semielliptic cylindrical dielectric waveguide on a perfectly conductive planar substrate. Interest is mainly in high eccentricity, electrically large, hence multimode, structures. The theory applies to light propagation through surface-wave transmission lines or microwave ducting by shore-bounded evaporation ducts. The rigorous formulation of fields in terms of radial and azimuthal Mathieu eigenfunctions is followed by accurate computations of the longitudinal phase constant, the fractional power trapped within the waveguide and the group velocity. The effects of size, ellipticity and refractive index step on mode features are investigated. As information, previously unavailable, about high-order modes is reported, an interesting classification of modes readily unfolds.

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