Abstracts

Eigenvalue approach to the efficient determination of the hybrid and complex spectrum of inhomogeneous, closed waveguide

T. Rozzi, L. Pierantoni and M. Farina. "Eigenvalue approach to the efficient determination of the hybrid and complex spectrum of inhomogeneous, closed waveguide." 1997 Transactions on Microwave Theory and Techniques 45.3 (Mar. 1997 [T-MTT]): 345-353.

Many hybrid modes are required in computing the fields scattered from discontinuities in structures such as finline, coplanar waveguide, or microstrip. The authors present a new analytical method based on an eigenvalue formulation of the generalized telegrapher's equations discretized by using the modes at cutoff as an expanding set. This approach produces a compact theoretical model while providing at the same time an effective algorithm for finding the characteristics of many modes, including their below cutoff and complex behaviour. The theoretical approach gives some direct insights about the appearance of complex modes. Due to the explicit formulation of the eigenvalue equation for the complex propagation constant, the proposed method overcomes some of the typical drawbacks of the currently used algorithms, such as the limited numerical accuracy and efficiency, the numerical degeneracy and appearance of spurious solutions, the inability to trace the characteristics of degenerate modes. Numerical results for ordinary and complex propagation in finline show excellent agreement with existing data.

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