Abstracts

Spectral Analysis Considerations Relevant to Radiation and Leaky Modes of Open-Boundary Microstrip Transmission Line (Short Papers)

J.M. Grimm and D.P. Nyquist. "Spectral Analysis Considerations Relevant to Radiation and Leaky Modes of Open-Boundary Microstrip Transmission Line (Short Papers)." 1993 Transactions on Microwave Theory and Techniques 41.1 (Jan. 1993 [T-MTT]): 150-153.

The continuous radiation spectrum of open microstrip transmission line and its nonspectral leaky modes are conceptualized through a transform-domain integral-operator formulation and relevant spectral analysis. Two complex (transform-variable) wavenumber planes are implicated by Sommerfeld-integral representations of associated Green's functions and the necessary axial inverse transformation to the space domain. The radiation spectrum is identified with branch cuts in the axial wavenumber plane, which constrain the migration of branch-point singularities in the transverse wavenumber plane. Leaky-wave modes occur only when the branch cuts in the axial wavenumber plane are violated, allowing branch points in the transvere wavenumber plane to migrate across the (initial) real-axis integration path. The relation between spectral radiation modes, nonspectral leaky-wave modes and branch cuts in the axial wavenumber plane is discussed. The influence of branch cuts in the axial wavenumber plane upon the location of branch points in the transverse wavenumber plane is detailed, and a rationale is offered for the choice branch cuts in the latter plane. Although the formulation is developed specifically for the microstrip line, it is applicable more generally to a wide class of open conducting or dielectric waveguides. It is believed that the ideas presented here are new and significant, and provide perhaps the first general method for conceptualizing the continuous spectrum of practical open waveguides.

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