Abstracts

Continuous Spectrum, Characteristic Modes, and Leaky Waves of Open Waveguides

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The modes of open waveguides with nonseparable cross sections are derived by means of an extension of the resonance equation for the electromagnetic field. Such modes, forming a continuous spectrum, allow us to apply to discontinuity problems in open environments the techniques originally developed for closed waveguides. In this paper, the resonance equation is generalized according to functional analysis considerations. By this approach, it is possible to derive the modal spectrum from the simultaneous diagonalization of the real and imaginary parts of the admittance of the structure. A variational interpretation of the solution of the generalized resonance equation gives additional insight into the modes of open waveguides. The generalized resonance equation, when applied to three-dimensional objects, provides the well-known characteristic modes of these structures. The relationship between continuous spectrum, characteristic modes, and leaky waves is also discussed.

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