Abstracts

Variational Finite-Element Solution for Dissipative Waveguides and Transportation Application

Al.D. McAulay. "Variational Finite-Element Solution for Dissipative Waveguides and Transportation Application." 1977 Transactions on Microwave Theory and Techniques 25.5 (May 1977 [T-MTT]): 382-392.

A procedure is developed for determining the complex propagation constants and associated complex electromagnetic fields as a function of frequency for electromagnetic waves propagating along an inhomogeneous waveguide composed of dissipative materials and having a complicated shape. The wave equation, which is complex because of the presence of dissipative materials, is transformed for computer solution into a matrix eigenvalue equation by the application of the Rayleigh-Ritz variational method in conjunction with the finite-element method. The results are reviewed for several simple dissipative waveguides for which analytical results are computed for comparison. A novel proposal is then investigated in which a railroad track acts as a surface waveguide for a rapid-transit collision-avoidance system. The results illustrate the usefulness of the numerical method developed and suggest that the modified steering rail warrants further investigation for rapid-transit systems.

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