Abstracts

Determination of simple equivalent circuits of interacting discontinuities in waveguides or transmission lines

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It is well known that the generalized scattering matrix (GSM) of a microwave network, which includes one or more ports supporting evanescent modes, is nonunitary. This has hindered the formation of equivalent circuits since it has not been evident how to form the impedance or admittance matrix. This paper describes how the problem has been overcome, resulting in a method for the formation of simple equivalent circuits of interacting closely spaced discontinuities in a waveguide. The n-port immittance matrix corresponding to the nonunitary GSM is formed by normalizing the imittance matrix to real or imaginary portal impedances. As an example, an equivalent circuit for the even mode of a waveguide short-slot coupler is presented, and the effect of the evanescent TE/sub 30/ mode in the coupling region is clearly expressed by an evanescent-mode waveguide in parallel with one supporting the dominant propagating mode. The method should find wide applications to problems involving interactions in waveguides.

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