Abstracts

Coupled-mode design of ferrite-loaded coupled-microstrip-lines section

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A coupled-mode approach is applied to a microstrip circulator with a distributed section of axially magnetized ferrite coupled lines (FCLs). The equivalent model of the FCL junction is found, which includes gyromagnetic interaction between propagated and evanescent isotropic modes. On the basis of the coupling process, the ferrite modes in the FCL are defined. From the decomposition of these modes, the waves in each line of the structure are determined. The mode matching is applied at the junction ports, which allows one to obtain the scattering matrix of the microstrip FCL. Validity of the approach is verified by checking the scattering parameters of the FCL section and comparing the numerical results with available measurements. The proposed model gives the properties with regards to the impedance matching and ferrite section dimensions, which can help the design of the FCL nonreciprocal devices. As an example, the S-parameters of an FCL circulator are presented.

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