

Theory of the Suppressed-Rotation Reciprocal Ferrite Phase Shifter

W.E. Hord, F.J. Rosenbaum and C.R. Boyd, Jr.. "Theory of the Suppressed-Rotation Reciprocal Ferrite Phase Shifter." 1968 Transactions on Microwave Theory and Techniques 16.11 (Nov. 1968 [T-MTT]): 902-910.

A theory for the Reggia-Spencer reciprocal ferrite phase shifter is presented which explains the characteristic behavior of this device in terms of a nonreciprocal coupling of cross-polarized waveguide modes. The dominant mode is a distorted TE/sub 10/-like mode similar to that of a dielectric slab-loaded waveguide. The cross-polarized mode is a hybrid mode which is below cutoff. If this mode propagates, Faraday rotation occurs. The boundary value problem for these modes, in a ferrite described by a scalar, frequency-dependent permeability, is solved and theoretical design data is presented. The frequency-dependence of phase shift and the onset of Faraday rotation is predicted and compares well with experimental results.

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