Abstracts

General Field Theory Treatment of H-Plane Waveguide Junction Circulators

M.E. El-Shandwily, A.A. Kamal and E.A.F. Abdallah. "General Field Theory Treatment of H-Plane Waveguide Junction Circulators." 1973 Transactions on Microwave Theory and Techniques 21.6 (Jun. 1973 [T-MTT]): 392-403.

In this paper an exact field theory treatment for the waveguide junction circulators is presented. The treatment is general, being dependent on neither the geometrical symmetry of the junction nor the number of ports. The electromagnetic fields in the joining waveguides are written in the form of infinite summation of waveguide modes. The solutions of the wave equations in the ferrite rod and in the surrounding air are obtained in the form of infinite summation of cylindrical modes. The fields at the ferrite air interface and at an imaginary boundary chosen arbitrarily between the air region and the waveguides are then matched. This process leads to an infinite system of nonhomogeneous equations in the field amplitudes. Three types of waveguide junction circulators using this technique are analyzed: the simple ferrite-rod Y junction, the simple ferrite-rod T junction, and the latching Y junction. Point-matching techniques are used to get numerical results for the field distributions and the circulator characteristics. Excellent agreement has been found between the published experimental measurements and the numerical results obtained by this technique.

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