Abstracts

Complex Gyrator Circuits of Planar Circulators Using Higher Order Modes in a Disk Resonator

J. Helszajn. "Complex Gyrator Circuits of Planar Circulators Using Higher Order Modes in a Disk Resonator." 1983 Transactions on Microwave Theory and Techniques 31.11 (Nov. 1983 [T-MTT]): 931-938.

Tire use of resonators or waveguides utilizing higher order modes is often an attractive solution to the design of millimeter microwave networks. This paper investigates the complex gyrator circuit of a planar junction circulator employing higher order solntions in a disk resonator. The first such solution displays many of the features of weakly magnetized junctions using the dominant mode in a disk resonator, but its loaded Q-factor is incompatible with the realization of quarter-wave coupled devices. Although the second one exhibits more useful equivalent circuits, it requires a relatively large magnetization, which is not altogether practical at millimeter frequencies. A circulator configuration that has a frequency response akin to that of a quarter-wave coupled one is one where the in-phase eigennetwork is degenerate with those of the demagnetized counter-rotating eigennetworks. The degeneracy between the in-phase limit, TM/sub 2, 0, -2/ and the second-order counter-rotating limit, TM/sub 1, 1, -2/ modes, in an oversized irregular hexagonal resonator, is used in this paper to construct such a device.

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