Abstracts

Modal Inversion in Circular Waveguides -- Part II: Application to Latching Nonreciprocal Phasers

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The characteristics of the nonreciprocal phase shifter (phaser) configuration, consisting of a circumferentially magnetized circular toroid in circular waveguide, have been investigated theoretically. By suitably filling the toroid center with a material having a high dielectric constant, it is possible to reverse the normal order of the cutoff frequencies of the TE/sub 11/ and the operating TE/sub 01/ modes. The enhanced modal purity resulting from this inversion could yield significant improvements in the performance of practical phasers. The characteristic equation has been derived for the general case of a magnetized toroid in a circular waveguide, with dielectric material in both the central region and external to the toroid. The equation is valid for an arbitrary range of dielectric constants and magnetization. Differential phase shift calculations have been made specifically for operation within the modal inversion window. It is found that adequate differential phase shifts are obtained, even under the restrictions on geometric dimensions and range of dielectric constants imposed by the inversion requirements.

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