Abstracts

Generalized Theory of Waveguide Differential Phase Sections and Application to Novel Ferrite Devices

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Since Fox introduced the concept of "differential phase shift" (DPS) sections in TE/sub 11/ mode cylindrical waveguide, most interest has been concentrated on devices having fixed DPS of 90° or 180°. This paper gives exact solutions for the magnitude, phase, and polarization of the wave output from three sections having variable DPS and orientations. The RF field is, successively resolved into components along the birefringence axes. Experimental results of tests carried out at X band, using a transversely magnetized ferrite tube, closely support the theory. It is shown how the latter can be applied, not only to familiar devices such as the rotary phase shifter or single sideband modulator, but also to new devices using ferrite sections of variable DPS or of switchable birefringence axes. A three-section power divider and attenuator is explained, together with a new two-section polarizer, with possible applications to satellites and search radar. It is also shown how one section can be used as a phase shifter. Some experimental results are given. Thus complete characterization of DPS section devices is offered by the theory, together with the quantitative effect of any of their parameters.

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