Abstracts

Characteristics of a Ferrite-Loaded Rectangular Waveguide Twist (Correspondence)

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The Faraday effect in a straight rectangular waveguide, a section of which is completely filled with a ferrite material subjected to an axial magnetic field, has been described by Du Pré, who states that, owing to the presence of a medium of dielectric constant and permeability greater than those of air, modes other than the usual TE/sub 10/ mode may be propagated in the ferrite-filled section. In particular, the TE/sub 01/ mode whose electric vector is perpendicular to the narrow dimension of the guide may be supported. If, owing to Faraday rotation, the TE/sub 10/ mode is converted to the TE/sub 01/, mode, propagation cannot take place beyond the ferrite-filled section. Experimentally this was confirmed by Du Pré who observed minimum of transmitted power for 90 degree rotation. Similar results were obtained in this laboratory with a straight rectangular guide loaded with a cylindrical ferrite specimen the ends of which were tapered for matching purposes as shown in Fig. 1(a). For a given axial magnetic field the reduction of transmitted power was Iargest with the specimen in the center of the guide, but, as might have been expected, no nonreciprocal effects were observed. A twisted rectangular waveguide section, however, loaded with the same specimen, exhibited nonreciprocal characteristics. In the experiment the sampIe was mounted centrally midway between the flanges of a 90 degree commercial 0.4x 0.9 inch twist and an axial magnetic field was applied as shown in Fig. 1(b).

❑ Return to main document.