Abstracts

Dispersion Characteristics of the Dipolar Modes in a Waveguide Partially Filled with a Magnetized Ferrite Column

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The electromagnetic wave propagation in a partially filled ferrite waveguide is studied by using both the quasi-static and exact analyses. Here, the ferrite is assumed to be lossless and completely magnetized. The cutoff and resonant frequencies are examined analytically to predict all possible modes, and numerical methods are then used to study the complete dispersion characteristics. Because of the geometrical generality of the problem, the fully filled ferrite waveguide and the ferrite column in free space can be considered as special cases. The classifications of the modes existing in various parametric regions are clarified. The effects of the ratio of the ferrite-to-waveguide radius and the dc axial magnetic field on the behaviors of the modes are studied and discussed. For large values of the phase constant, asymptotic dispersion equations can be derived, and turn out to be the same in both analyses. A comparison between the two sets of results is also made to examine the validity of the quasi-static analysis. The method of analysis used in this present paper is similar to the one used in the corresponding paper on partially filled plasma waveguides published previously.

❑ Return to main document.