Abstracts

Bragg Interaction of Electromagnetic Waves in a Ferrite Slab Periodically Loaded with Metal Strips

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The waveguiding characteristics of electromagnetic TE waves in a ferrite slab periodically loaded with metal strips are investigated. Theoretical formulation by means of the spectral domain approach is employed to obtain the Brillouin diagrams of two types of volume modes and a surface mode. It is found that the nonreciprocal properties of waves depend on the metal strip profile and bias magnetic field strength. Experiments on the magnetic-field dependence of the Bragg frequency and the stop bandwidth are carried out in the millimeter-wave frequencies. Typical results obtained from a polycrystalline YIG slab with periodic gold strips deposited on one surface are stop bandwidth about 2.14 GHz, with return loss about 2 dB at the Bragg frequency of 47.5 GHz, for the bias magnetic-field strength of 5.7 kG. The Bragg frequency can be tuned over the range of 1.39 GHz by varying the bias magnetic field from 0 to 8.2 kG. Experimental results show good agreement with theoretical predictions.

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