Abstracts

Frequency Doubling Using Ferrite Slabs, Particularly Planar Ferrites

I. Bady. "Frequency Doubling Using Ferrite Slabs, Particularly Planar Ferrites." 1962 Transactions on Microwave Theory and Techniques 10.1 (Jan. 1962 [T-MTT]): 55-64.

An analysis is given of the results of frequency doubling experiments using relatively thick ferrite slabs. The primary frequency was 9100 Mc. It is shown that the dielectric properties of the ferrite cause the double-frequency wave to behave as a surface wave. This tends to concentrate the double-frequency fields in the vicinity of the ferrite, thus increasing its interaction with the oscillating magnetic-dipole moments that generate these fields and increasing the conversion efficiency. However, the surface-wave effect also causes a phase difference between the magnetic-dipole moments and the double-frequency fields, and this limits the efficiency obtainable through this effect. Experimental data give reasonable agreement with calculated results. Spinwave effects are considered, and it is shown that they can contribute to harmonic generation if the precession orbits of their magnetization vectors are highly elliptical. The best conversion efficiency obtained in these experiments was -11.1 db at a peak input power level of 6300 w. Planar ferrites have inherent advantages over isotropic ferrites because the planar anisotropy greatly increases the ellipticity of the precession of the magnetization vectors of both the uniform mode and the spinwaves. The relatively large dielectric constant of planar ferrites is also helpful to frequency doubling.

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