Abstracts

Theoretical Limitations to Ferromagnetic Parametric Amplifier Performance

R.W. Damon and J.R. Eshbach. "Theoretical Limitations to Ferromagnetic Parametric Amplifier Performance." 1960 Transactions on Microwave Theory and Techniques 8.1 (Jan. 1960 [T-MTT]): 4-9.

It has been commonly expected that improved operation of the ferrite parametric amplfier could be obtained by use of materials of narrower resonance linewidth, Delta H. This parameter is critical in determining the pumping power (P/sub p/) required for operation of the device. Also of importance, however, is the limitation of device properties determined by the dependence on Delta H of the instability threshold of the spin-wave system. Considering this limitation, the maximum voltage gain-fractional bandwidth product (g/sub v/Delta omega/omega/sub 1/) has been determined as a function of other device parameters, and typical values calculated for several modes of operation. In the electromagnetic mode, for example, there is an optimum Delta H which yields maximum g/sub v/Delta omega/omega/sub 1/) at a given pumping power. It is also shown that a minimum filling factor, also a function of Delta H for some types of operation, is required to reach the oscillation threshold even in the unloaded device.

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