Abstracts

Delay Spectra of Single Crystal Ferrimagnetics when Loaded by Polycrystalline Ferrites

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Magnetostatic, magnetoelastic and elastic wave propagation in magnetically saturated single crystal round and square cross-section rods of yttrium iron garnet (YIG), possessing non-ellipsoidal geometry, has been extensively studied. However, the resulting delay characteristics versus dc applied magnetic field and frequency are necessarily non-optimum for certain microwave applications. The object of this paper is to demonstrate the feasibility of polycrystalline ferrite loading for modifying and controlling magnetoelastic delay spectra. This technique has the advantage that sample geometry, which determines the internal magnetostatic field configuration, can be adjusted simply and cheaply without disturbing the single crystal specimens in which the magnetoelastic propagation takes place. Further, if necessary, experiments can be conducted on a minimal volume of single crystal material. The discussion is restricted to the axially magnetized arrangement shown in Figure 1. More sophisticated geometries are currently under consideration. Figure 1 A depicts a single crystal ferrimagnetic round rod, of saturation magnetization 4 pi M/sub 1/, loaded with a polycrystalline sleeve, of saturation magnetization 4 pi M/sub 2/. Figure 1 B depicts a single crystal rod (4 pi M/sub 1/) backed by a polycrystalline ferrite 4 pi M/sub 2/) of identical cross-section.

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