Abstracts

Control of Resonant Frequency of YIG-Disk Filter by Doublet Tuning (Correspondence)

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Magnetically tunable filters generally use ferromagnetic resonators in the shape of a sphere. The most common ferromagnetic material is single-crystal yttrium iron garnet (YIG), which has a saturation magnetization 4piM, of approximately 1750 Oe. YIG spheres are satisfactory at frequencies down to almost 2 GHz, but doping is required (for instance, with gallium) to obtain high-Q resonance at lower frequencies. Since it is difficult to control the 4piM, of Ga YIG, tuning adjustments have to be provided in multi-resonator filters, usually by a rotation of one of the Ga YIG spheres on a dielectric rod, changing the angles between its crystalline axes and the applied magnetic field. The lower the operating frequency of the filter, the more doping is required, and the greater the variation in 4piM, from resonator to resonator. By using disks rather than spheres, less doping is required. However, it is more difficult to adjust the resonant frequency of a disk by rotation, than it is for a sphere. Another technique was therefore developed, using a pair of disks with adjustable spacing between them for each resonator; the spacing is adjusted to control the resonant frequency of the composite resonator.

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