Abstracts

Modeling coplanar waveguide structures constructed of ferromagnetic metal

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We fabricate coplanar waveguide transmission lines with thin-film Fe/sub 0.2/Ni/sub 0.8/ conductors. These lines demonstrate a power attenuation of 10 dB/cm at ferromagnetic resonance frequencies of 5 to 10 GHz for applied magnetic fields less than 100 mT (1 kG). In addition, the phase of the transmitted wave can be tuned by about 20 degrees/cm by adjusting an applied magnetic field. We present a simple model for the complex reflected and transmitted waves as a function of material characteristics, geometry, and applied field. We model the skin effect influence on the transmission line circuit parameters, including the line impedance and propagation constant, by considering the full effects of the conductor permeability and conductivity.

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