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Nonlinear effects in iron based microstrip structures.[1] ZBIGNIEW CELINSKI, UCCS, BIJOY K. KUANR, YURI V. KHIVINTSEV, ANDREW HUTCHISON, ROBERT E. CAMLEY — Nonlinear effects in magnetic films are a subject of growing interest. The onset of parametric instability translates into practical power limits for microwave devices. Nearly all high power studies were done in ferrites; recently An et al investigated Permalloy. No work has been performed on planar devices or on iron films. Here we investigate the transmission of cw-microwaves in a 6 mm x 13 micron, 200 nm iron based microstrip notch filter in the frequency domain. There are three regions in the transmission response. Up to a threshold power of P = 90 mW, the differential absorption of ferromagnetic resonance (FMR) is nearly constant as a function of input power. Above P, the sample absorption decreases significantly as the power is increased. In addition we observe a subsidiary absorption (SA) peak at a frequency above that of the FMR. In comparison to Fe, a 7.2 micron YIG film in the transducer geometry has P at 1$\sim$2 mW; for a permalloy 128 nm film it is 10 mW. This indicates that an Fe microstrip has a much higher power handling capability. Finally, our structures can also be used as a power limiter. The SA can be significantly increased at high powers, thus limiting the transmission in the frequency range where the SA occurs

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