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DC and High-frequency Magnetic Properties of Patterned Ferromagnetic Nanostructures[1] HUAJIE KE, YITZI CALM, MARK TUOMINEN, Department of Physics, Center for Hierarchical Manufacturing, University of Massachusetts Amherst — Magnetic mesoscopic and nanostructures have promising applications such as high-density data storage, magnetic field sensors, and microwave devices. Patterned magnetic structures are especially interesting because their constitutive material, sizes and geometry are easily adjustable in fabrication. This work aims to study dc and radio frequency magnetic properties of Co and permalloy patterned structures and the effect of magnetic coupling. We use electron-beam lithography and complementary techniques to ferromagnetic nanostructures with various separations to control the strength of magnetic interaction. SQUID and complimentary MFM characterization are performed to observe the dc magnetic properties. AC susceptibility is used to investigate the low frequency response. Microstrip transmission lines are then incorporated to measure the scattering parameters between 300kHz and 6GHz. The equivalent RLCG circuit elements can be extracted to obtain the effective magnetic permeability for different ferromagnetic structures.

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