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Simulating magnetic permeability measurements of a resonant ferromagnetic thin film in the GHz range with a short circuited microstrip using COMSOL Multiphysics ALEXANDER CABOT[1], San Jose State University — The goal of the project is to simulate measurements of complex magnetic permeability of a ferromagnetic (FM) thin film with Landau-Lifshitz-Gilbert resonance and recover input parameters as proof of concept. Simulation experiments were conducted by designing a permeameter using a short circuited microstrip in COMSOL Radio Frequency module. The $S_{11}(f)$ reflection parameter of the empty structure, structure with an empty dielectric substrate, structure with substrate and calibration thin film, and structure with substrate with the sample resonant thin film were measured. Reflection measurements are used to calculate effective permeability of the sample and the calibration film is used to fit the permeability of the sample film. The predicted frequency response was detected in the real and imaginary parts of magnetic permeability. Large exponential growth in the magnetic permeability at low frequencies, likely due to interaction between the microstrip structure and FM thin film, were also observed. This project is different than similar experiments because this simulation models the whole design and measurement process.

[1]MS Physics students at SJSU expected to complete degree in Fall 21 semester with aspirations to earn a PhD in physics.

Alexander Cabot
San Jose State University

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