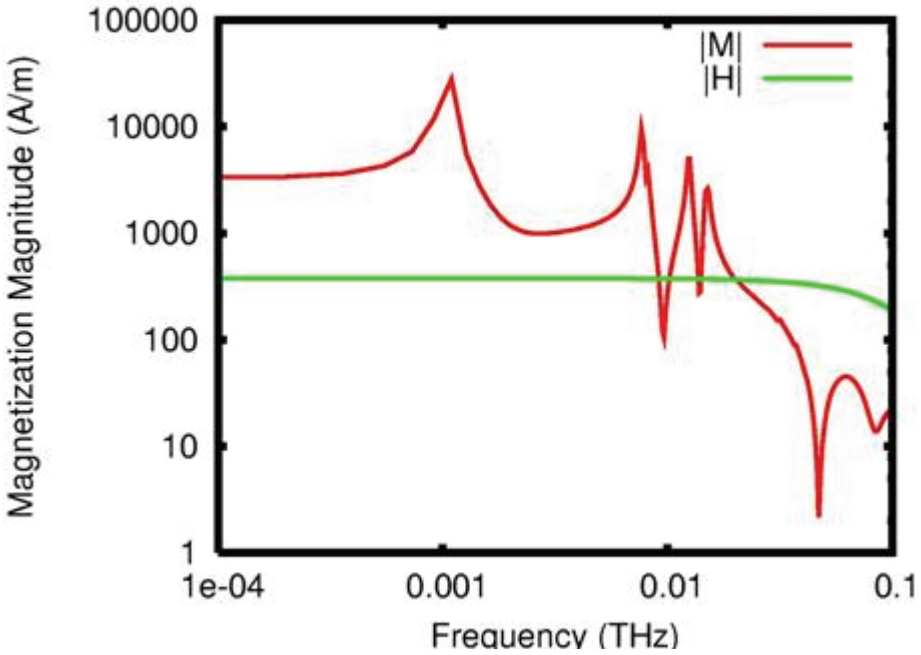
NPNM Micromagnetics Data (Using PIMM and LLG Micromagnetics Codes)

Micromagnetics has been used to study the magnetic response of nanoscale ferromagnetic particles at a variety of field intensities. It was found that as the field intensity increased, the permeability and internal magnetization spectrums became increasingly complex, featuring multiple absorption peaks and harmonics, until the spectrum degenerated into white noise. Example results are shown in the following.

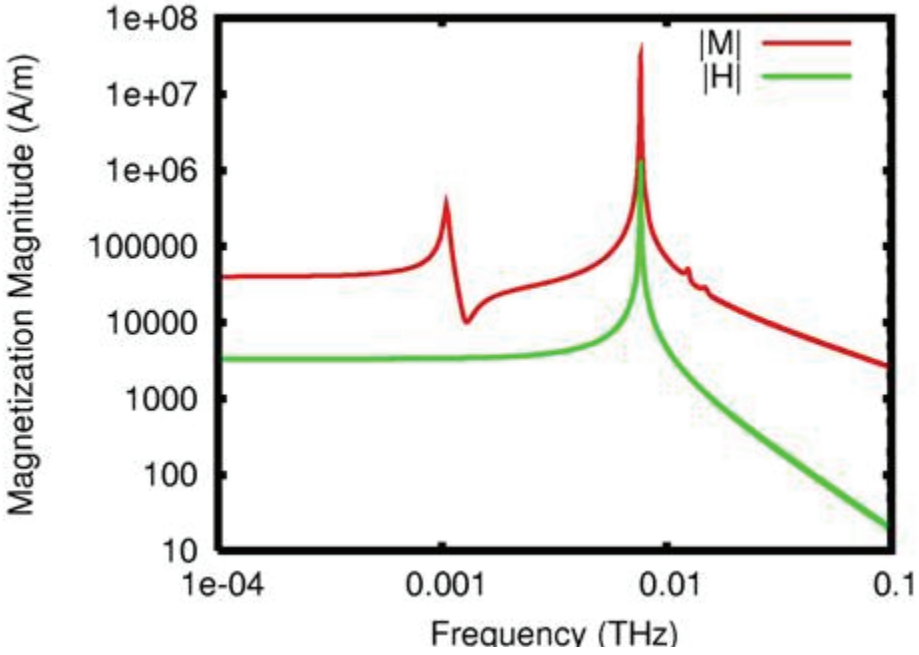
NiFe slab: 102.4 nm by 96 nm by 16 nm

Gaussian magnetic pulse applied:



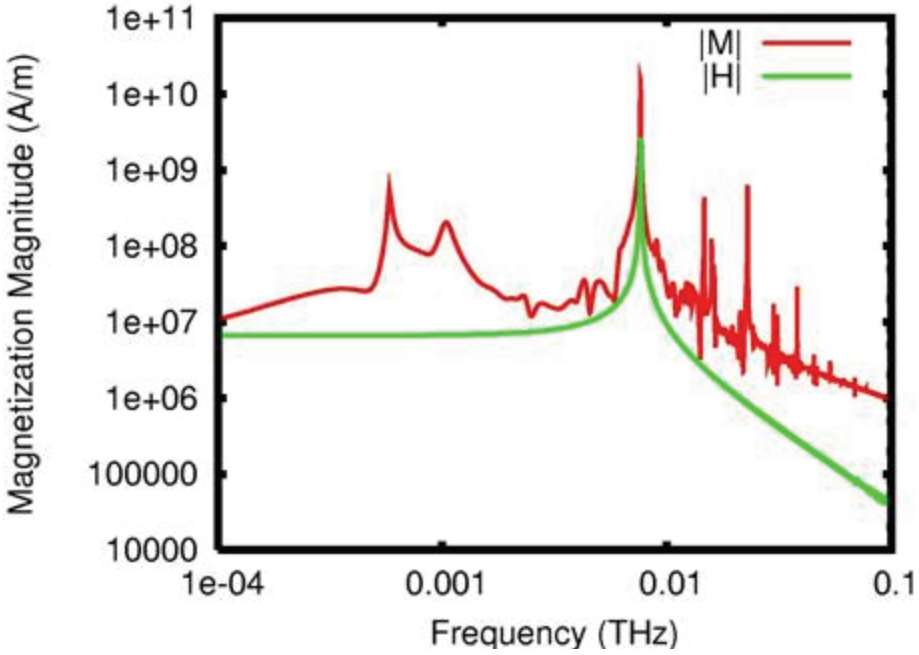
Resonances at 1.1 GHz, 7.63 GHz, 12.5 Ghz, and 15.2 GHz.

0.1 Oe CW magnetic field applied at 7.63 GHz:



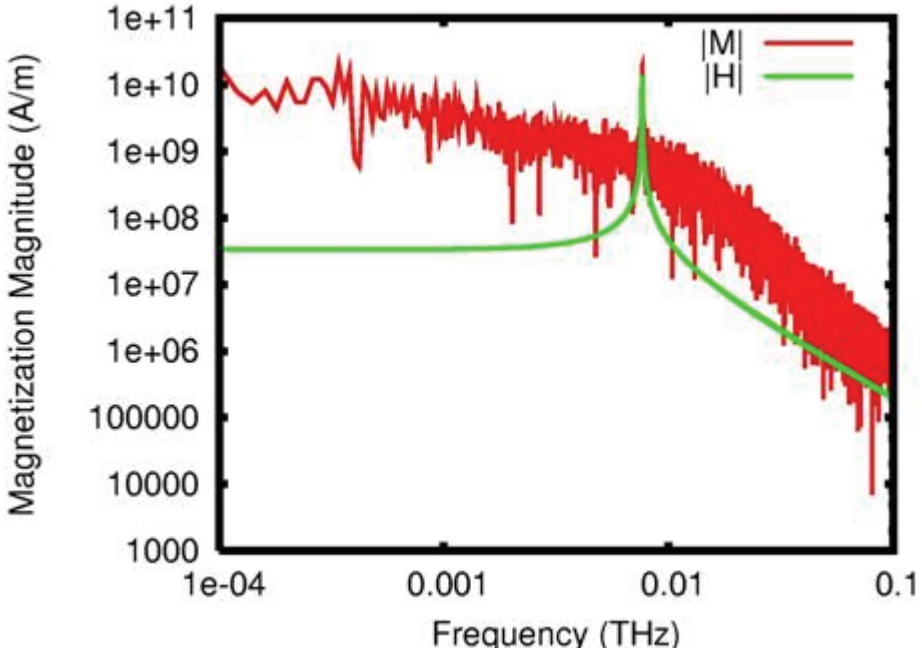
Resonances at 1.04 GHz, 7.63 GHz.

200 Oe CW magnetic field applied at 7.63 GHz:



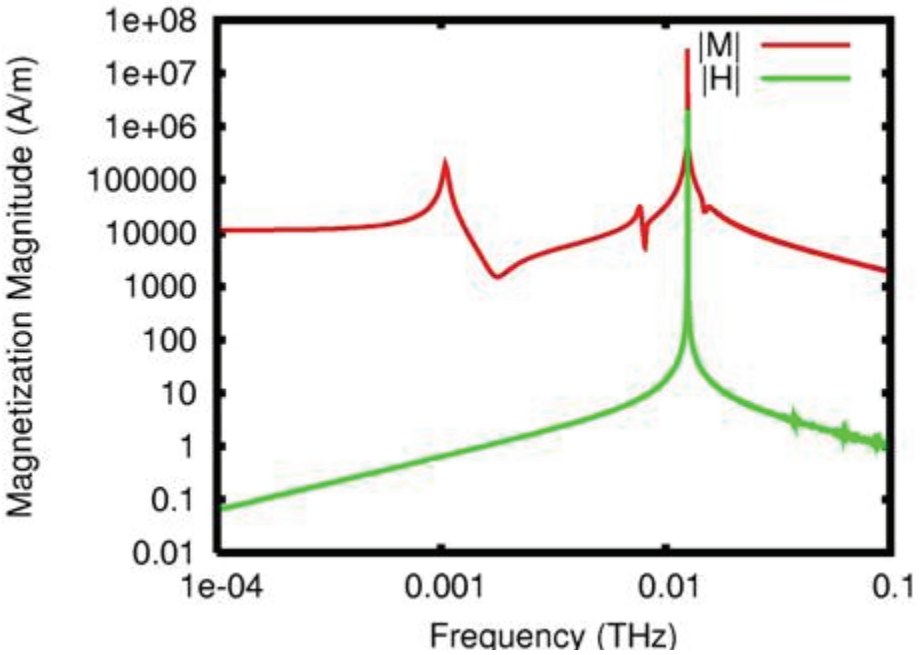
Resonances at 580 MHz, 1.04 GHz, 7.63 GHz, 22.8 GHz, 38.0 GHz.

1000 Oe CW magnetic field applied at 7.63 GHz:



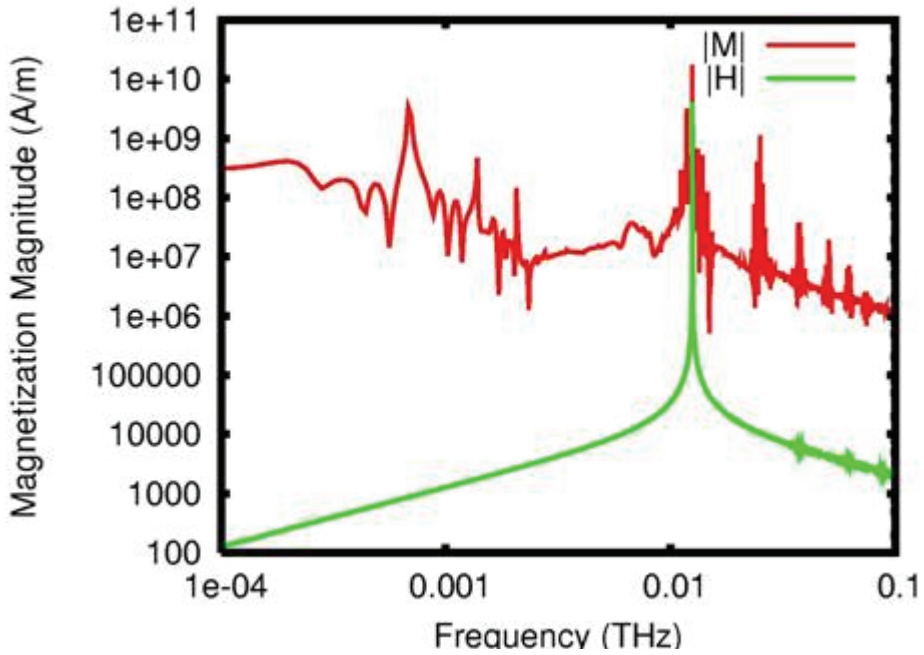
No discernable resonances.

Oe CW magnetic field applied at 12.5 GHz:



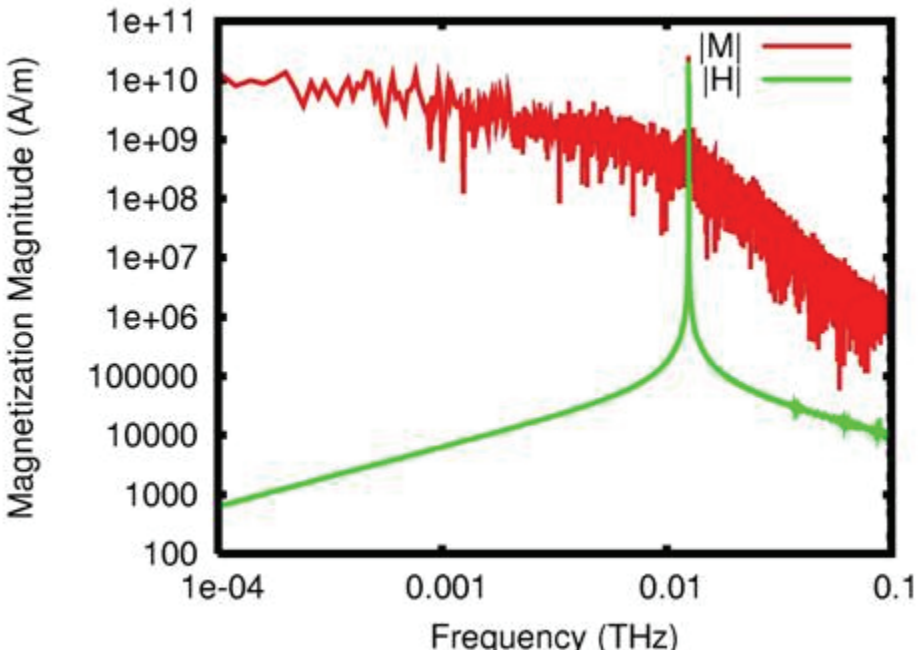
Resonances at 1.03 Ghz, 7.9 GHz, and 12.5 GHz.

200 Oe CW magnetic field applied at 12.5 GHz:



Resonances at 683 MHz, 1.38 GHz, 12.5 GHz, 24 GHz, 36.5 GHz, etc.

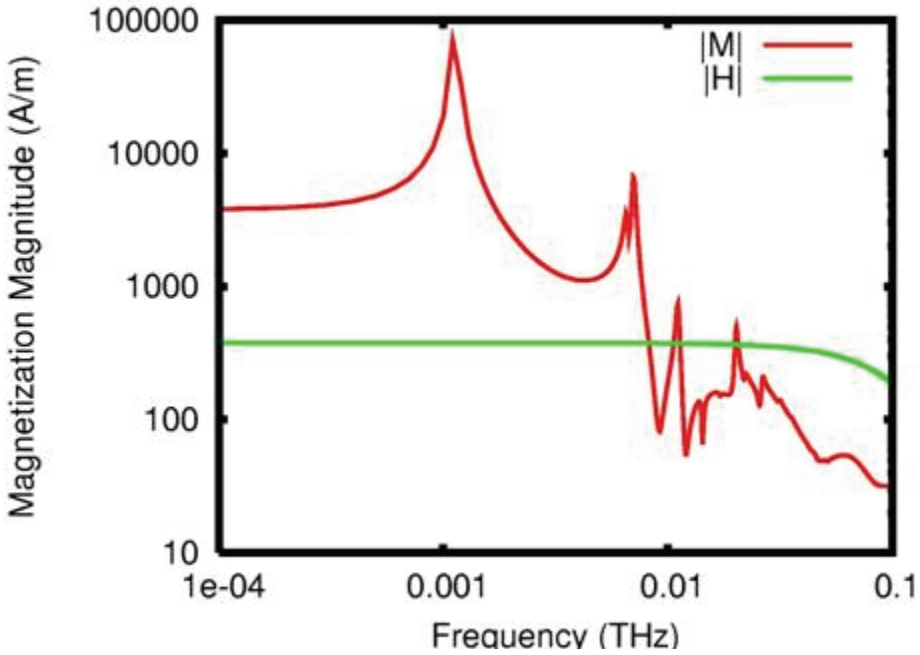
1000 Oe CW magnetic field applied at 12.5 GHz:



No discernable resonances.

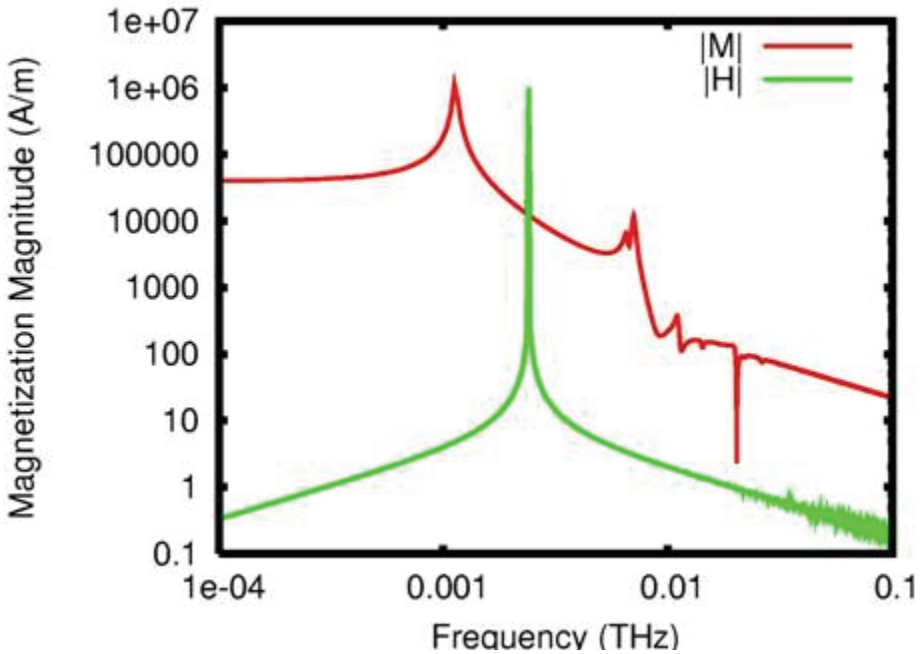
NiFe prism: 53 nm by 46 nm by 40 nm

Gaussian magnetic pulse applied:



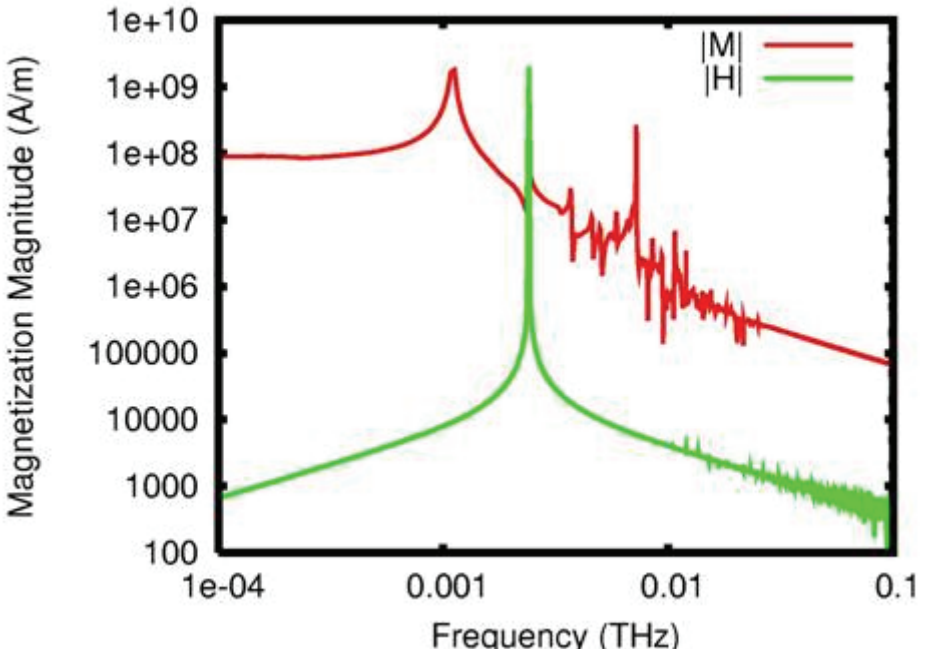
Resonances at 1.2 GHz, 7 GHz, etc.

0.1 Oe CW magnetic field applied at 2.40 GHz:



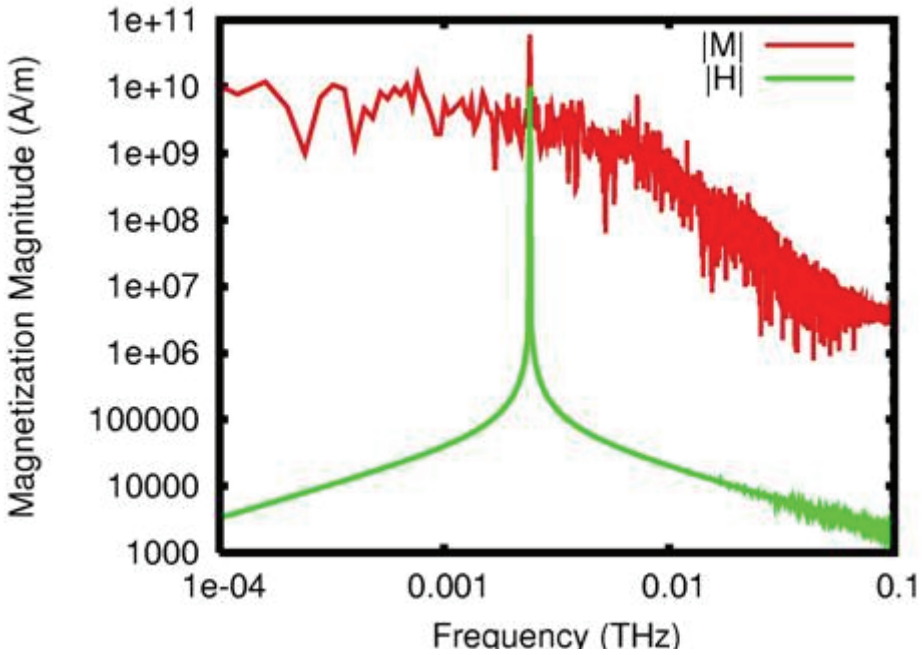
Resonances at 1.12 GHz, 2.4 GHz, 7.0 GHz, 11.0 GHz.

200 Oe CW magnetic field applied at 2.40 GHz:



Resonances at 1.2 GHz, 2.4 Ghz, noise from 3.7 GHz to 20 GHz, peak at 7.2 GHz.

1000 Oe CW magnetic field applied at 2.40 GHz:



No discernable resonances.

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