Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Parametric excitation of a magnetic nanocontact by a microwave field[1] SERGEI URAZHDIN, West Virginia University, VASIL TIBERKEVICH, ANDREI SLAVIN, Oakland University — We demonstrate that magnetic oscillations of a current-biased magnetic nanocontact can be parametrically excited by a microwave field applied at twice the resonant frequency of the oscillation. The threshold microwave amplitude for the onset of the oscillation decreases with increasing bias current, and vanishes at the transition to the auto-oscillation regime. The dependence of parametric excitation on the driving frequency is strongly asymmetric, which is caused by the nonlinearity of the studied dynamical system. Based on our observations and analysis, we propose a simple quantitative method for the characterization of magnetic nanoelements. We show that by measuring the threshold and frequency range of parametric excitation, it is possible to determine damping, spin-polarization efficiency, and coupling coefficient to the microwave signal. In addition, by measuring the frequency range of parametric synchronization in the auto-oscillation regime, one can independently determine the dynamic nonlinearity of the nanomagnet.

[1]Supported by NSF DMR-0747609, ECCS-1001815, ECCS-0967195, and the Research Corporation.

Sergei Urazhdin
West Virginia University

Date submitted: 10 Nov 2010 Electronic form version 1.4