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Dynamical Coupling of Nanomagnets due to Spin Transfer[1]
SERGEI URAZHDIN, West Virginia University, WENG-LEE LIM, NICHOLAS ANTHONY, ANDREW HIGGINS — Spin transfer devices typically incorporate a thick magnet polarizing the electric current, and a thin layer driven by spin torque. However, spin torque acting on both layers is significant in devices with comparable thickness of magnetic layers. Moreover, dynamics of one of the magnetic layers results in oscillations of the polarization of the current flowing through the other layer, which can lead to dynamical coupling between them. We discuss results of simulations and measurements, demonstrating several consequences of such dynamical coupling. First, the dynamics of both layers are always simultaneously excited by the current. Second, the critical current for the onset of magnetic dynamics is scaled by the ratio of the thicknesses of the magnetic layers, diverging when the two are the same. This behavior is caused by the coupled precession of two magnetic layers reducing the efficiency of spin transfer. Below the critical current, a hysteretic regime is found in which a dynamical state and a static parallel configurations are possible. This regime may explain the 1/f noise and broad precession peaks that are often observed in the spectra of current-induced excitations.

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