Coupled current-induced magnetic dynamics of ferro- and antiferromagnetic layers

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Present-day spintronics uses electric field to manipulate with magnetic moments of ferromagnetic (FM) layers. However, utilization of antiferromagnets (AFM) as active parts of spintronic units promises transition to ultra-high-speed and low-energy devices. Recent experiments demonstrated sensitivity of AFM layers to spin-polarized current [1] and their ability to change the state of adjacent FM layer [2]. In the present paper we study magnetic dynamics of FM and AFM layers separated with thin nonmagentic layer (NM) in the presenence of electric and/or spin current.

The model includes standard dynamic equations for FM and AFM moments supplemented with the balance equation for nonequilibrium spin density carried by free electrons. We show that spin pumping from AFM layer increases damping of the whole structure and analyse back-action of AFM on the state of FM layer in the presence of electric current.

References:

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[2] K. J. Lee, T.H.Y. Nguyen, and K.-Ho Shin, *J. Magn. Magn. Mater.*, **304**, 102 (2006)