

Magnetization dynamics in magnetic heterostructures

W. Skowroński¹

¹*AGH University of Science and Technology,
Institute of Electronics, Al. Mickiewicza 30, 30-059 Kraków, Poland*

Investigation of the magnetization dynamics in thin films and multilayer heterostructures can lead to the determination of several important material parameters, such as magnetization saturation, anisotropy energy or damping. In addition, analyzing the response of the system upon excitation with a spin polarized current, one can get more insight into the origin of the torque which is important for applications [1].

During the talk I will first discuss the ferromagnetic resonance (FMR) in a model system excited by the magnetic field and spin orbit torques in heavy metal/ferromagnetic multilayers [2]. I will extend the model by discussing different sources [3] of the spin current and symmetries of the response [4].

Then I will move to the discussion of the magnetization dynamics in magnetic tunnel junction. Magnetization precession induced by radio-frequency voltage application enables determination of the influence on the electric field on the magnetic anisotropy also in a GHz frequency range [5]. Upon application of the DC current in the optimized structure one can also obtain a stable magnetization precession, which can be further stabilized using the magnetic feedback loop [6].

Finally, I will discuss the FMR in multiferroic heterostructures, where the FMR signal can be measured in both soft and hard-magnetic layers using both spin-torque and spin pumping effects [7]. I will also introduce the cMTJ software which enables fast numerical simulations of the spintronic heterostructures [8].

References:

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