

Study of the angular dependence of ferromagnetic resonance in nanorods

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We have developed a theory describing the magnetization dynamics in nanorods under an external magnetic field oriented arbitrarily with respect to the symmetry axis of the nanorod. First we determine the non-collinear ground state by Monte Carlo simulation. In the next step we calculate numerically the spin-wave spectrum by solving the system of coupled Landau-Lifshitz equations of motion. A single FMR peak is observed at a certain (critical) angle between the external field vector and the symmetry axis of the nanorod; the singlet splits into a multi-peak spectrum as the field is tilted from this critical orientation. We attempt to elucidate the physical grounds of this numerically disclosed resonance effect in magnetic nanorods. This study is a part of a project financed by Narodowe Centrum Nauki (National Science Center of Poland), Grant no. DEC-2013/08/M/ST3/00967.