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Magnetic resonance in a ferromagnetic film with modulated anisotropy under the orientational phase-transition

Yu.I. Dzhezherya[1], D.P. Azarkh[2], V.V. Kruglyak[3]

[1] Institute of Magnetism, Natl. Acad. of Sci. of Ukraine and Ministry for Ed. and Sci. of Ukraine. Vernadsky Blvd. 36-b, Kyiv-03680, Ukraine.
E-mail: dui_kpi@ukr.net

2 Faculty of Physics and Mathematics, The National Technical University of Ukraine "Kyiv Polytechnic Institute". Prosp.Peremohy 37, Kyiv-03656, Ukraine.

3 The University of Exeter. Exeter, Devon EX4 4SB, UK.

We consider the magnetization distribution iron of garnet films with the through-thickness modulated magnetic anisotropy. The energy density is given by: , where α – the exchange interaction constant; $\beta(z)$ – the uniaxial anisotropy parameter; **H** – the external magnetic field vector; **M** – the magnetization vector.

Fig. 1 shows the dependence of the deviation of the magnetization vector from the film's normal on the coordinate ξ. The point ξ_0 is the coordinate of interphase boundary that separates the different types of magnetic configurations. This interphase boundary has a high mobility in the static case is in a state of equilibrium. Under the alternating field interphase boundary oscillations occur and at frequency determined by the expression possible resonance. Damping ratio has the form: , where H_0 – constant component of the magnetic field; a_G – dissipation constant in the Hilbert form; – the characteristic frequency of the magnetic system; – coefficient determining the gradient anisotropy; ; μ_0 – Bohr magneton; β_0 – some constant; γ – angel between external magnetic field and the normal of the film.

Thus, materials with garnet ferrite film thickness anisotropy modulating interfacial separation and possible resonance of interphase boundary oscillations. These effects are extremely sensitive to the magnetic field orientation.