Nanocomposites and nanomaterials

Magnetization hysteresis of nanogranular films with perpendicular anisotropy

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The magnetic field dependences of the stability boundaries of the nonequilibrium magnetic states that exist in a nanogranular film with perpendicular anisotropy in tilted magnetic fields are theoretically described, and the corresponding critical magnetization is calculated [1]. The field dependences of the critical magnetization of the film are analyzed at various ratios of the anisotropy field of particles to the maximum possible demagnetizing field of the film. In a tilted magnetic field, the magnetization reversal curves, which include hysteresis loops, are shown to consist of segments of the following three types: equilibrium stable magnetization, nonequilibrium stable magnetization, and critical type of magnetization.

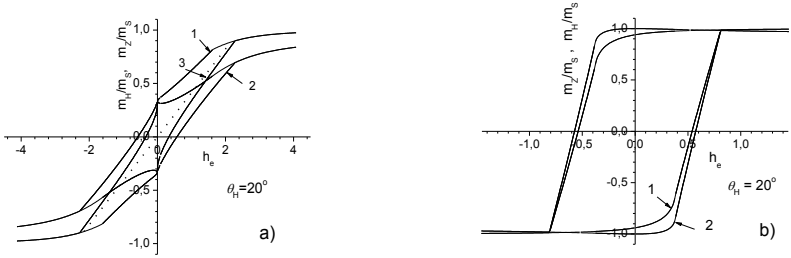

Fig. 1. Normalized magnetization m_H/m_s and m_z/m_s in magnetic fields tilted at angles θ_H=20°. (1), (2) - projections m_H/m_s and m_z/m_s, a) - anisotropy field is smaller than the maximal demagnetization field ($H_{a\theta} / H_d^{\max}$ =1/3), b) - anisotropy field greater than the maximal demagnetization field ($H_{a\theta}/ H_d^{\max}$ =3).

1. *Kalita V. M., Ryabchenko S. M.* Critical magnetization and hysteresis of nanogranular films with perpendicular anisotropy // Journal of Experimental and Theoretical Physics.-2014.-**118.**-P. 284-296.