NONLINEAR DYNAMICS OF VORTEX-LIKE DOMAIN WALLS IN MAGNETIC UNIAXIAL MULTILAYERED FILMS WITH IN-PLANE ANISOTROPY

B.N. Filippov and F.A. Kassan-Ogly
Institute of Metal Physics, Ural Division, Russian Academy of Sciences, Ekaterinburg, Russia

9.7 cm

By numerical solution of Landau-Lifshitz equation, taking into account all interactions (including the dipole-dipole) we investigated the nonlinear dynamics of domain walls in multilayered magnetic films. We considered in detail the films composed of three layers differing both in their thickness and magnetic parameters. Easy axes are parallel to the film surface and each other. Apart from scientific purposes related to the study of nonlinear phenomena the motivation of such investigations is dictated by the possibility of establishing the conditions under which the nonstationary motion of the walls is suppressed and their velocity increases. Novel scenarios of dynamic rearrangement of the wall internal structure are found. In the films 100 nm thick, the rearrangement occurs via creation of two vortexes disposed over one another, while in the single-layer films of the same thickness, the rearrangement occurs by vortex tunneling from one side of a wall to the other. Application of surface layers with other magnetic parameters increases the period of rearrangement of the wall structure or even suppresses its nonstationary motion. Application of the layers with saturation induction B_s differing from the main layer most effectively suppresses nonstationary motion, however above some critical field no suppressing occurs at any induction.

13.4 cm

Subject category :

3. Magnetic Structure and Dynamics

Presentation mode :
oral

Corresponding author :
B.N. Filippov

Address for correspondence :
Institute of Metal Physics, Ural Division,
Russian Academy of Sciences,
ul. S.Kovalevskoi 18, Ekaterinburg, 620041, Russia

Email address :
filbor@imp.uran.ru