Superconductor-Ferromagnet Bilayers: Influence of Magnetic Domain Structure on Vortex Dynamics

ANDREY BELKIN, Argonne National Laboratory and Illinois Institute of Technology, V. NOVOSAD, M. IAVARONE, J. PEARSON, W.K. KWOK, G. KARAPETROV, Argonne National Laboratory — We investigate the influence of orientation of stripe-like domain structure in ferromagnetic films on vortex dynamics in superconductor-ferromagnet bilayers. We measure transport properties in different external magnetic fields applied perpendicular to the surface of the bilayers. Parameters of superconductor-ferromagnet bilayers are such that domain period is much bigger than the superconducting coherence length but much smaller than the effective penetration depth. Prominent dissimilarity of critical currents of two studied configurations as well as pronounced commensurability effects are found. Diverse behavior of superconductor-ferromagnet bilayers with mutually orthogonal orientations of stripe domains is demonstrated by dependence of critical temperature on external magnetic field.

1This work was supported by UChicago Argonne, LLC, Operator of Argonne National Laboratory (“Argonne”). Argonne, a U.S. Department of Energy Office of Science Laboratory, is operated under Contract No. DE-AC02-06CH11357

Andrey Belkin
Argonne National Laboratory and Illinois Institute of Technology