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Manipulation of the magnetic flux in superconductor by the ferromagnetic domains in SC/FM hybrid¹ VITALII VLASKO-VLASOV, ULRICH WELP, GORAN KARAPETROV, VALENTIN NOVOSAD, Argonne National Laboratory, ANDREI BELKIN, Argonne National Laboratory & Illinois Institute of Technology, DANIEL ROSENMANN, WAI KWOK, Argonne National Laboratory — We studied magneto-optically the magnetic flux entry and exit in SC/FM hybrid of a ferromagnetic permalloy film sputtered on the superconducting NbSe₂ single crystal. The FM film had growth induced perpendicular anisotropy and the labyrinth equilibrium domain structure. However, we could align the domain walls in a desired direction by application of a strong enough in-plane field. Thus formed stripe domains introduce a pronounced directionality for the vortex motion in the underlying superconductor. The effect persists up to the fields of the stripe domain collapse and does not depend on the temperature at which the domain walls were polarized. It does not change at heating the sample and cooling back below T_c. We discuss the effect in terms of the domain wall pinning of vortices in conditions when the domain size is larger than the coherence length and propose a scheme for manipulating the transport properties of superconductors by the ferromagnetic domains.

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