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Magnetic vortices induced by a moving tip¹ MARTIN P. MAGIERA, ALFRED HUCHT, DIETRICH E. WOLF, Faculty of Physics, University of Duisburg-Essen, 47048 Duisburg, Germany — A two-dimensional easy-plane ferromagnetic substrate interacting with a dipolar tip which is magnetized perpendicular with respect to the easy plane is studied numerically by solving the Landau-Lifshitz Gilbert equation [Europhys. Lett. **100**, 27004 (2012)]. Due to the symmetry of the dipolar field of the tip, in addition to the collinear structure a magnetic vortex structure becomes stable. It is robust against excitations caused by the motion of the tip. The moved vortex structure shows an increased energy dissipation compared to the collinear structure. We show that for high excitations the system may perform a transition between the two states. The influence of domain walls, which may also induce this transition, is examined.

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