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Dzyaloshinskii-Moriya Domain Walls in Nanotubes¹ OLEG TRETIAKOV, IMR, Tohoku University, ARSENI GOUSSEV, Northumbria University, J.M. ROBBINS, VALERIY SLASTIKOV, University of Bristol — We study domain walls in thin ferromagnetic nanotubes with Dzyaloshinskii-Moriya interaction (DMI). Dramatic effects arise from the interplay of space curvature and spin-orbit induced DMI on the domain wall structure in these systems. The domain walls become narrower in systems with DMI and curvature. Moreover, the domain walls created in such nanotubes can propagate without Walker breakdown for arbitrary applied currents, thus allowing for a robust and controlled domain-wall motion. The domain-wall velocity is directly proportional to the non-adiabatic spin transfer torque current term and is insensitive to the adiabatic current term. Application of an external magnetic field along the nanotube axis triggers rich dynamical response of the curved domain wall. In particular, we show that the propagation velocity is a non-linear function of both the applied field and DMI, and strongly depends on the orientation and chirality of the wall.

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