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Möbius-strip shaped nanomagnet with easy-axis anisotropy

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Properties of Möbius strip shaped magnetic nanoparticles with easy-axis anisotropy are studied and compared with untwisted bar-shaped strip [1, 2]. In the case of the weak easy-axis anisotropy, the vortex state is formed. It corresponds to a single-domain state in the planar strip. Growth of the anisotropy rate results in the competition between dipolar interaction and easy-axis anisotropy. The bar-shaped particles become multidomain. Twisting of the planar bar to the Möbius strip leads to the state which is unique for this geometry: a topologically protected domain wall. Magnetization is directed perpendicularly to the strip surface in the case of the strong anisotropy and one domain with one domain wall appears due to twisting. In general case for large samples the odd number of transversal walls is formed in particular places of the strip.

[1] MAGPAR finite element micromagnetics package, <http://www.magpar.net>

[2] Computing Center of Bayreuth University, <http://rz.uni-bayreuth.de>