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Evolution of magnetic states in ferromagnetic nanorings in an applied azimuthal field[1] ABBY GOLDMAN, KATHERINE AIDALA, Mount Holyoke College, TIANYU YANG, MARK TUOMINEN, University of Massachusetts, Amherst — Ferromagnetic nanorings form unique magnetic states that hold tremendous potential for maximizing data storage densities. One such state is the closed-flux vortex state, in which the magnetic field is completely enclosed within the ring, thus minimizing the magnetostatic energy, but also keeping the exchange energy low as adjacent magnetic moments are mostly aligned. A natural way to generate this state is through an external azimuthal field, as if from a current carrying wire passing through the center of the ring. We perform micromagnetic simulations to investigate the evolution of magnetic states in an external azimuthal field. For some applied current, the chirality of the ring will reverse, often into an intermediate state that evolves into a perfect vortex at higher current. Thin, wide rings have significantly lower switching currents than thick, narrow rings. We examine the dependence of the switching current and intermediate states on geometric properties such as the diameter, thickness, asymmetry and width of the ring.

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