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The creation of 360 degree domain walls in ferromagnetic nanorings by circular applied magnetic fields JESSICA BICKEL, SPENCER SMITH, KATHERINE AIDALA, Mount Holyoke College — 360° domain walls (DWs) are the proposed transition state of ferromagnetic nanorings which are candidate devices for magnetic memory. Using micromagnetic simulations [1], we examine the formation of 360° DWs created by the application of a circular Oersted field for the transition of a 5nm thick ring from a CCW to a CW vortex. The magnetic reversal begins by canting of the magnetization either inward or outward. As the spin continues to rotate, exchange interactions result in the rotation of adjacent spins. Finally, the rotate spin aligns with the applied magnetic field, creating a transition state made of two 180° DWs of opposite winding number. As the center of the rotated domain grows, the 180° walls of adjacent domains meet. Adjacent domains cant in opposite directions to lower the magnetostatic energy relative to canting in the same direction. Therefore 180° DWs at the boundaries have the same winding number and combine to form 360° DWs. Each pair of rotated domains results in a pair of two 360° DWs of opposite winding number. This work provides better understanding of the formation of 360° DWs and may lead to the ability to control the formation of DWs via geometry. [1] http://math.nist.gov/oommf

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