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360 Degree DW formation during vortex to vortex switching in thin ferromagnetic nanorings in an applied circular field[1] YINENG SUN, ABBY GOLDMAN, ABIGAIL LICHT, YIHAN LI, NIHAR PRADHAN, Mount Holyoke College,MA, TIANYU YANG, MARK TUOMINEN, University of Massachusetts Amherst, MA, KATHERINE AIDALA , Mount Holyoke College,MA — We present simulations of the switching process between clockwise and counterclockwise vortex states in ferromagnetic nanorings in an applied circular field, relevant to potential data storage devices. This circular field can be experimentally generated by passing current through the solid metal tip of an atomic force microscope, which has achieved vortex-to-vortex switching in thicker asymmetric rings [1]. We find that in sufficiently thin rings, the vortex switching process occurs through the nucleation and annihilation of pairs of 360 degree domain walls (DW), with opposite topological indices. The DW with the same circulation as the vortex annihilates first. We can control which DW annihilates first by offsetting the center of our circular field to target a specific DW. Both exchange energy and demagnetization energy must be considered in predicting the energy barrier to DW annihilation. [1] T. Yang, N.R. Pradhan, A. Goldman, A.S. Licht, Y.Li, M. Kemei, M.T. Tuominen, K.E. Aidala. APL, 98, 242505 (2011).

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