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Detection of Magnetic Antivortices with Magnetic Force Microscopy[1] BRIAN SHAW, MARTIN ASMAT-UCEDA, LIN LI, ARABINDA HALDAR, KRISTEN BUCHANAN, Colorado State University, NANOMAGNETISM AND MAGNET DYNAMICS TEAM — Magnetic antivortices (AV's) are uniquely shaped domain pattern that involve magnetic moments that sweep inwards from two opposing directions, e.g., the top and bottom, then outwards to the left and right, with a central out-of-plane core that is only ∼10 nm in diameter at the intersection. AV's possess interesting and potentially useful properties but they are metastable and are thus difficult to create reliably. We recently showed that AV's will form in pound-key-shaped structures made from Permalloy that are on the order of tens of microns in size. In this talk, I will discuss measurements of the statistics of the AV formation several different variations on this design. Arrays that contained 625 nominally identical structures were magnetized using fields at and near the coercive field of the structures as determined from hysteresis measurements, and then the arrays were imaged using magnetic force microscopy (MFM) to identify the magnetic states. The AV's can be easily identified in MFM images by their distinct hourglass shape. For each structure design at least three areas, each containing 25 structures, were imaged to determine the success rate of the AV formation. Our results show that the details of the geometry are important and confirm that the hysteresis measurements can be used to select the best fields for a given structure design.

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