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Magnetization Reversal Study of Geometrically Frustrated, Quasiperiodic Antidot Arrays[1] JUSTIN WOODS, VINAYAK BHAT, BARRY FARMER, LANCE DE LONG, Department of Physics and Astronomy, University of Kentucky, TODD HASTINGS, Department of Electrical and Computer Engineering, University of Kentucky, JOSEPH SKLENAR, JOHN KETTERSON, Department of Physics and Astronomy, Northwestern University — We have used electron beam lithography to pattern quasiperiodic AD arrays in permalloy films of thickness 25 nm. Two five-fold rotationally symmetric Penrose tilings were fabricated with AD kites and darts having long (d1) and short edges (d2) equal to 1620 nm or 810 nm, and 1000 nm or 500 nm, respectively, with fixed Py line width of 100 nm. Two eight-fold Ammann tilings were patterned with square and rhomboid AD of edge lengths of 1000 nm or 2000 nm, resp. Magnetization reversal was studied at various angles between the in-plane, applied DC magnetic field H and the quasiperiodic array. We observed very reproducible hysteresis curves with low-field anomalies not present in our previous studies of periodic, square arrays of square-, circular- and diamond-shaped AD; e.g., for the Penrose tilings, we observed four reproducible knee anomalies (both for 81 <H <331 Oe, and for -19 >H >-71 Oe). Micromagnetic simulations exhibit systematic evolution of domain walls (DW) in the hysteretic regime due to DW pinning by edges of the quasicrystalline pattern, which correlates DW evolution with observed features in magnetic hysteresis.

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