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Micromagnetic Simulations of Quasiperiodic (Penrose Tiling) Antidot Arrays[1] BARRY FARMER, VINAYAK BHAT, JUSTIN WOODS, 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 performed static and dynamic micromagnetic simulations of permalloy antidots (AD) patterned on quasiperiodic arrays of 25 nm film thickness. Two Penrose tilings (five-fold rotationally symmetric) were simulated with AD kites and darts with long (d_1) and short edges (d_2) equal to 1620 nm or 810 nm, and 1000 nm or 500 nm, respectively, and fixed Py line width of 100 nm. Two Ammann tilings were patterned with square and rhomboid AD of edge lengths 1000 nm or 2000 nm, and line width of 100 nm. Our simulations exhibit FMR modes not previously predicted; for example, power and phase maps for Penrose tilings exhibit three bulk modes (at angles $\varphi = 0^{o}$, 72^{o} and 144^{o} with respect to in-plane applied DC field H) and two edge modes ($\varphi = 72^{o}$ and 144^{o}) for H = 1.2 kOe. Static micromagnetic simulations exhibit highly repeatable evolution of domain walls (DW) with apparent long-range order in the ***hysteretic regime***. We attribute this remarkable reproducibility in a ***geometrically frustrated, aperiodic system*** to magnetic reversal controlled by DW pinning by AD edges.

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