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Simulations of magnetic reversal in continuously distorted artificial spin ice lattices[1] BARRY FARMER, VINAYAK BHAT, JUSTIN WOODS, Department of Physics and Astronomy, University of Kentucky, J. TODD HASTINGS, Department of Electrical and Computer Engineering, University of Kentucky, LANCE DE LONG, Department of Physics and Astronomy, University of Kentucky
— Artificial spin ice (ASI) systems consist of lithographically patterned ferromagnetic segments that behave as Ising spins. The honeycomb lattice is an ASI analogue of the Kagomé spin ice lattice found in bulk pyrochlore crystals. We have developed a method to continuously distort the honeycomb lattice such that the pattern vertex spacings follow a Fibonacci chain sequence. The distortions break the rotational symmetry of the honeycomb lattice and alter the segment orientations and lengths such that all vertices retain three-fold coordination, but are no longer equivalent. We have performed micromagnetic simulations (OOMMF) of magnetization reversal for many samples having different strengths of distortion, and found the kinetics of magnetic reversal to be dramatically slowed, and avalanches (sequential switching of neighboring segments) shortened by only small deviations from perfect honeycomb symmetry. The coercivity increases as the distortion is strengthened, which is consistent with the retarded reversal.

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