

Abstract Submitted
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Influence of Boundary Conditions on Metastable Lifetimes for The Ising Model on the Hyperbolic Plane¹ HOWARD L. RICHARDS, Physics, Marshall University, DIPENDRA SHARMA CHAPAGAIN, Physics, Berea College, JAMES MOLCHANOFF, Math, West Virginia Wesleyan University — Some corals grow in shapes that resemble 3D models of the hyperbolic plane, since this allows them to have greater area for a given growth radius. Each polyp could be represented by an Ising site, with “feeding” = “up” and “retracted” = “down”. The mechanisms of metastable decay could be interpreted as how the coral as a whole reacts to changing conditions of food availability or predation. Previous studies have shown that there is a spinodal field for the Ising model on a regular lattice in the hyperbolic plane if it is infinite or has periodic or mean-field boundary conditions. This happens because the size of the boundary grows asymptotically at the same rate as the droplet volume, in clear contrast with droplets in the Euclidean plane. Our simulations show, however, that the spinodal field disappears if more physically relevant open boundary conditions are used instead.

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