Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Monte Carlo Studies of the Isoperimetric Dimension of Growing Droplets in Metastable Decay of the Ising Model on Small-World Graphs HOWARD L. RICHARDS, Physics & Physical Science, Marshall University — For the Ising model on a regular, nearest-neighbor lattice of less than 6 dimensions, metastable decay occurs via the nucleation of critical droplets; subcritical droplets are biased toward shrinkage, whereas supercritical droplets are biased toward growth. The size of a critical droplet is governed by the competition between the coupling of the magnetic field to the volume of the droplet, which lowers the free energy, and the coupling of the droplet of the stable state to metastable state at the boundary of the droplet, which increases the free energy. This competition between volume effects and surface effects makes the isoperimetric dimension relevant to metastable decay. The simulations discussed here are for a triangular lattice with a small percentage of "small-world" connections. The system initially has only one "down" spin, from which the droplet grows; switching is irreversible and only occurs for "up" spins adjacent to at least one "down" spin.

Howard L. Richards
Physics & Physical Science, Marshall University

Date submitted: 16 Dec 2008 Electronic form version 1.4