1145-60-216 **John C. Wierman*** (`jwierma1@gmail.com`), Dept. of Applied Mathematics & Statistics, 100 Whitehead Hall, Johns Hopkins University, Baltimore, MD 21218. *Recent progress on bounding bond percolation thresholds.* Preliminary report.

Percolation is an infinite random graph model which is one of the simplest models to exhibit a phase transition. In the bond percolation model, a random subgraph is obtained from an infinite connected graph G by retaining each edge independently with probability p, $0 < p < 1$. The percolation threshold $p_c(G)$ is the edge retention probability value above which the random subgraph contains an infinite connected component. The exact percolation threshold is known for only a few periodic lattice graphs, and rigorous bounds for unsolved graphs are generally rather poor.

We will discuss two comparison methods, which relate the threshold of an unsolved lattice graph to the threshold of an exactly-solved lattice. The substitution method uses stochastic ordering, symmetry reduction, non-crossing partitions, and network flow algorithms to compute improved bounds, and has been used to disprove long-standing conjectured exact values for two common planar lattices. A growth process approach obtains upper bounds for the bond percolation thresholds of common three-dimensional lattices, by exploring a sub-cluster of the open cluster as a dynamic process, then projecting onto a selected plane to obtain a two-dimensional growth process, for comparison with an exactly-solved lattice. (Received August 20, 2018)