1151-60-59 **John C. Wierman*** (jwierma1@gmail.com), Dept. of Applied Mathematics & Statistics, 100 Whitehead Hall, Johns Hopkins University, Baltimore, MD 21218. *Progress on bond and site percolation threshold bounds for Archimedean lattices.* Preliminary report.

There are few lattice graphs for which the bond or site percolation threshold is exactly known, and rigorous bounds for unsolved lattices are generally not very accurate. The substitution method uses the equivalence of stochastic ordering and coupling to compute percolation threshold bounds. It has recently determined the three leading digits of the bond percolation threshold for one Archimedean lattice, disproving a long-standing conjectured exact value in the physics literature. Recent results for the eleven Archimedean lattices, which are vertex-transitive tilings of the plane by regular polygons, will be surveyed. Techniques involving graph-welding, non-crossing partitions, symmetry, and network flow models, which make the substitution method computations possible, will be discussed. While most previous research has focused on applying the substitution method to bond percolation models, improved bounds for percolation thresholds of some site percolation models will be provided. (Received August 07, 2019)