**Percolation threshold bounds for the 2-uniform (3,4,3,12;3,122) lattice**

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A percolation model is an infinite graph, from which edges are deleted independently with probability p. The percolation threshold of an infinite graph is the critical probability pc above which there exists a connected, infinite component. Most research so far has focused on calculating exact values and rigorous bounds for the percolation threshold of the Archimedean lattices. This research focuses on calculating the percolation threshold of a two-uniform tiling, a lattice where each vertex has one of two sequences of faces surrounding it. We use these vertex configurations to name the tiling. This talk will be focusing on the (3,4,3,12;3,122) lattice. Each vertex of this graph has one of two face sequences: triangle-square-triangle-dodecagon, or triangle-dodecagon-dodecagon. The (3,4,3,12;3,122) lattice is one of exactly twenty 2-uniform lattices. Due to its structure, very accurate bounds for its bond percolation threshold may be computed: 0.667119 < pcbond< 0.680215. Furthermore, it is the only one of the 2-uniform lattices that is a line graph. Since the site percolation threshold of a line graph equals the bond percolation threshold of the underlying graph, very accurate bounds of 0.755081 < pcsite< 0.775549 are also obtained for its site percolation threshold. The bounds are obtained using the substitution method, which is based on the equivalence of stochastic ordering and coupling in probability theory, with computational efficiencies involving partition lattices, non-crossing partitions, symmetry reductions, and network flow algorithms.

Keywords: Percolation threshold, two-uniform lattices, line graphs, partition lattice, non-crossing partition