

On percolation threshold curves for 3-uniform hypergraphs

Since the origins of percolation theory in the 1950s, a major challenge has been to determine the percolation threshold exactly for a large class of lattices. Research by Ziff and Scullard identified a class of lattices formed by replacing each hyperedge of a 3-uniform self-dual periodic hypergraph by a “generator” graph, for which the solution of a simple equation provides the exact percolation threshold. The result may be re-interpreted in terms of a “threshold curve,” which provides the exact solution for any generator in a 3-uniform self-dual periodic hypergraph. We consider the concept of threshold curve for non-self-dual 3-uniform periodic hypergraphs, such as the kagome hypergraph, for which an exact threshold curve has not been found, although bounds for it may be determined.