

Coordinate Percolation on Z^3

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Abstract:

Consider the set of columns of the Z^3 lattice that are parallel to one of the coordinate axis. We decide whether to remove the columns in this set independently from each other and with probability depending on their directions. Then we study the percolative properties of the random set of remaining vertices in Z^3 .

We show that this percolation model undergoes a phase transition as the removal parameters are varied: For high parameters there exist no infinite connected components whereas they do exist for small parameters.

We also show that the rate of decay of the tail of the (truncated) radius of the cluster containing the origin is not always exponential: That rate is at most polynomial if two or more removal parameters are set high enough.