

Percolation-diffusion Functions in GNU-R

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Abstract

In this work, a set of functions are implemented in GNU-R to simulated diffusive and percolation dynamics by random walks on \mathbb{Z}^d regular lattices. This functions allow calculated magnitudes such as, mean square displacement, percolation threshold, critical exponents and correlation length, all of them fundamental quantities to understand the diffusive properties and phase transitions in non-equilibrium systems. The percolation threshold p_c is the minimum density of conductor sites that it needed to have an infinite cluster, i.e., a set of connected sites that spans the system. For a p values very close to p_c on the supercritical regime ($p > p_c$) the parameter p_∞ (the density of the infinite cluster), the correlation length ξ (the characteristic scale of the system) and the mean cluster size χ follows approximately a power-law behaviour with characteristic critical exponents. However, in general, calculate analytically and numerically the percolation threshold, this critical exponents and others important magnitudes, is still an open problem on many kind of lattices.

References

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