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Self-avoiding walk on nonunimodular transitive graphs. (English) Zbl 1448.60187

Summary: We study self-avoiding walk on graphs whose automorphism group has a transitive nonunimodular subgroup. We prove that self-avoiding walk is ballistic, that the bubble diagram converges at criticality, and that the number of self-avoiding walks of length \( n \) is comparable to the \( n \)th power of the connective constant. We also prove that the same results hold for a large class of repulsive walk models with a self-intersection based interaction, including the weakly self-avoiding walk. All of these results apply in particular to the product \( T_k \times \mathbb{Z}^d \) of a \( k \)-regular tree \((k \geq 3)\) with \( \mathbb{Z}^d \), for which these results were previously only known for large \( k \).

MSC:
60K35 Interacting random processes; statistical mechanics type models; percolation theory
05C25 Graphs and abstract algebra (groups, rings, fields, etc.)
60G50 Sums of independent random variables; random walks
05C30 Enumeration in graph theory
82B41 Random walks, random surfaces, lattice animals, etc. in equilibrium statistical mechanics

Keywords:
self-avoiding walk; nonunimodular; transitive graph; mean-field; nonamenable; bubble diagram

Full Text: DOI arXiv Euclid

References:


[34] Nienhuis, B. (1982). Exact critical point and critical exponents of \( \langle \sum_{p \subset \mathbb{Z}} \langle \text{vertex} \rangle \rangle(n) \rangle \) in two dimensions. Phys. Rev. Lett. 49 1062-1065.


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