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Directed random walk on an oriented percolation cluster

Matthias Birkner, Jiri Cerny, Andrej Depperschmidt, Nina Gantert

(Submitted on 13 Apr 2012 (v1), last revised 11 Sep 2012 (this version, v2))

We consider directed random walk on the infinite percolation cluster generated by supercritical oriented percolation, or equivalently the space-time embedding of the `ancestral lineage' of an individual in the stationary discrete-time contact process. We prove a law of large numbers and an annealed central limit theorem (i.e., averaged over the realisations of the cluster) using a regeneration approach. Furthermore, we obtain a quenched central limit theorem (i.e.\ for almost any realisation of the cluster) via an analysis of joint renewals of two independent walks on the same cluster.
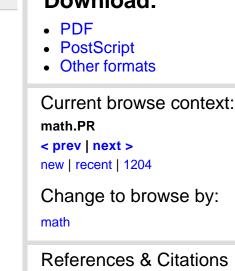
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