Pimentel, Leandro P. R.

The time constant and critical probabilities in percolation models. (English) Zbl 1112.60082

Electron. Commun. Probab. 11, 160-167 (2006).

Summary: We consider a first-passage percolation (FPP) model on a Delaunay triangulation $\mathcal{D}$ of the plane. In this model each edge e of $\mathcal{D}$ is independently equipped with a nonnegative random variable τ_e, with distribution function $\mathbb{F}$, which is interpreted as the time it takes to traverse the edge. *M. Q. Vahidi-Asl* and *J. C. Wierman* [in: Random graphs '87, 341–359 (1990; Zbl 0760.05023)] have shown that, under a suitable moment condition on $\mathbb{F}$, the minimum time taken to reach a point x from the origin 0 is asymptotically $\mu(\mathbb{F})|x|$ where $\mu(\mathbb{F})$ is a nonnegative finite constant. However the exact value of the time constant $\mu(\mathbb{F})$ is still a fundamental problem in percolation theory. Here we prove that if $\mathbb{F}(0) < 1 - p_c^*$, then $\mu(\mathbb{F}) > 0$, where p_c^* is a critical probability for bond percolation on the dual graph $\mathcal{D}^*$.

MSC:

60K35 Interacting random processes; statistical mechanics type models; percolation theory
82C43 Time-dependent percolation in statistical mechanics
82D30 Statistical mechanics of random media, disordered materials (including liquid crystals and spin glasses)

Full Text: DOI arXiv EuDML