FLUCTUATIONS AROUND THE ASYMPTOTIC SHAPE IN FIRST-PASSAGE PERCOLATION UNDER LOW MOMENTS

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Abstract: We consider first-passage percolation on the d-dimensional cubic lattice $\mathbb{Z}^d$, i.e., we assign independently to each edge of $\mathbb{Z}^d$ a nonnegative random weight with a common distribution, and consider an induced random graph distance (which is the so-called first passage time). Our aim is to study fluctuations of the shape induced by the first passage time from the origin.

The same problem has been investigated by Alexander, Kesten and Zhang. They assumed that weights are equal to zero with probability smaller than the critical probability of bond percolation on $\mathbb{Z}^d$, and have a finite exponential moment. We observe their results under low moments. The key tools are some concentration inequalities for the first passage time. Recently, Bucheron, Lugosi and Massart have studied concentration inequalities based on the entropy method. Their method usefully works for the outer deviation of the shape. In addition, Zhang's concentration result enables us to derive the inner deviation of the shape.

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