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Abstract

Doctor of Philosophy

Asymptotic properties of Robinson–Schensted–Knuth algorithm and jeu de taquin

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The Thesis is divided into three main parts, each concerning a different *limit problem for random Young tableaux*.

In the first part we show that in the Plancherel growth process of a random Young diagram *the growths which occur in the first k bottom rows of the diagram* are asymptotically independent and that asymptotically, when $n \to \infty$, for each of the first k rows the dynamics of its growth in time n can be modelled by a Poisson process with intensity $n^{-1/2}$.

In the second part, we study *the bumping routes in the surrounding of the first column* in a big random Plancherel distributed tableau. We show that in the projective coordinates the rows in which the bumping route 'jumps between' the columns can be asymptotically modelled by a Poisson process.

In the last part we investigate whether there exist some *typical shapes of the sliding path and the evacuation path* in a random rectangular tableau. We show that each of these random paths concentrates near a random curve from some particular family. We then transfer these results to the setup of *Totally Asymmetric Simple Exclusion Process* to obtain the description of the limit trajectory of the second class particle in TASEP.