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Department of Mathematics
The Chinese University of Hong Kong

數學系
香港中文大學

Phone: (852) 3943 7988-9 • Fax: (852) 2603 5154 • Email: dept@math.cuhk.edu.hk
Rm. 220, Lady Shaw Building, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

Seminar

Exceptional Times for a Dynamical Version of Critical First-passage Percolation in Two Dimensions

by

Dr. Wai Kit Lam
University of Minnesota Twin Cities

Abstract:

Consider the triangular lattice $\mathbb{T}$. We put i.i.d. nonnegative weights (τ_v) on the vertices of $\mathbb{T}$ with common distribution function F. We will study the critical case, $F(0) = p_c = 1/2$. Let ρ be the "first-passage time to infinity", which, roughly speaking, is defined as the minimal amount of total weight gained when we travel from the origin to infinity. In an earlier work with M. Damron and X. Wang, we showed that $\rho < \infty$ almost surely if and only if $\sum a_k < \infty$, where $a_k = F^{-1}(p_c + 2^{-k})$. In an ongoing project with M. Damron, J. Hanson and D. Harper, we study a dynamical version of this model. We further put independent rate 1 Poisson processes on the vertices. When the Poisson process at a vertex v increments, we resample τ_v. We study the behavior of ρ_t, the corresponding ρ in this dynamical environment at time t.

In the case $\sum a_k = \infty$ (so $\rho = \infty$), we consider the exceptional times: the times t such that ρ_t is finite. We show that the Hausdorff dimension of the set of exceptional times is almost surely $31/36$, but surprisingly the Minkowski dimension depends on the sequence (ka_k): For instance, if $\liminf ka_k = 0$, then the upper Minkowski dimension is 1, while if $ka_k \to \infty$, the Minkowski dimension is $31/36$. In the case $\sum a_k < \infty$, the exceptional times are the times at which $\rho_t = \infty$. In this case, we show that if $\sum k^{7/8} a_k < \infty$, then the set of exceptional times is almost surely empty.

Date	:	August 4, 2021 (Wednesday)
Time	:	2:30pm to 3:30pm
Venue	:	Room 219, Lady Shaw Building, CUHK

All are Welcome