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The Hong Kong University of Science and Technology

Department of Mathematics

Mathematics Colloquium

Self-organized criticality in 2D forest fire processes

by

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Abstract

Bernoulli percolation is a model for random media introduced by Broadbent and Hammersley in 1957. In this process, each vertex of a given graph is occupied or vacant, with respective probabilities p and 1-p, independently of the other vertices (for some parameter p). It is arguably one of the simplest models from statistical mechanics displaying a phase transition as the parameter p varies, i.e. a drastic change of behavior at some critical value p_c, and it has been widely studied.

Percolation can be used to analyze forest fire (or epidemics) processes. In such processes, all vertices of a lattice are initially vacant, and then become occupied at rate 1. If an occupied vertex is hit by lightning, which occurs at a (typically very small) rate, all the vertices connected to it burn immediately, i.e. they become vacant. In particular, we want to analyze the near-critical behavior of such processes, that is, when large components of occupied sites start to appear. They display a form of self-organized criticality, and the phase transition of Bernoulli percolation plays an important role: it appears "spontaneously".

This talk is based on a joint work with Rob van den Berg (CWI and VU, Amsterdam).

Date: **Friday, 18 October 2019**

Time: **3:00p.m. - 4:00p.m.**

Venue: **Lecture Theater F,**
Academic Building, 1/F
(near Lifts 25 - 26), HKUST

All are welcome!