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Title :
Maximal flows : a different aspect of first-passage percolation

Abstract :

Consider the standard model of first-passage percolation on Z^d : associate with each edge e of the graph a non-negative random variable t(e). The variable t(e) can be interpreted in different ways, among them we can cite the following :
(i) t(e) is the time needed to cross the edge e
(ii) t(e) is the capacity of e, i.e., the maximal amount of water, or information, that can cross the edge e per second
(iii) t(e) is the conductivity of e in an electric network…
The first interpretation is the most common one. It leads to the definition of a pseudo-metric on the graph, that is the subject of many past and present studies. During this talk, we will focus on the second interpretation, that was introduced by Kesten in 1987.

In this setting, the first object to study is the maximal flow (of water, information) that can cross a part of the graph per second. By the max-flow min-cut theorem, it is equivalent to study the minimal capacity of a random hyper-surface called cutset. Then we can look at the behavior of the cutset itself, and we can investigate how the water circulate inside the graph.

The aim of the talk is to understand the similarities and the differences between the classical interpretation of the model and this one, to present what is known in this setting, and maybe also what is still not understood.