Large deviations for random walks with random holding times

Ryoki Fukushima
(Research Institute for Mathematical Sciences, Kyoto University)

Abstract: We consider a random walk in random environment with random holding times, that is, the random walk jumping to one of its nearest neighbors with some transition probability after a random holding time. Both the transition probabilities and the laws of the holding times are randomly distributed over the integer lattice. Our main result is a quenched large deviation principle for the position of the random walk.

The same problem has been studied by Dembo, Gantert, and Zeitouni in one-dimensional case. They assumed that the transition probabilities are uniform elliptic and holding times bounded away from zero but otherwise only quite general ergodicity and integrability conditions. We consider the multidimensional case with rather restrictive independence assumptions: the transition probability and holding times are i.i.d. and mutually independent. On the other hand, we need a weaker ellipticity assumption and also do not assume that holding times are bounded from below. We also assume the so-called "nestling condition" for the transition probability, which allows us to get a simple expression of the rate function.

I will also mention some sub-exponential tail estimates for the slow-down probability.

Based on joint work with Naoki Kubota (Nihon University).