

Random walks in random environment

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The model of random walks in random environment (RWRE) originates from physical and biological sciences and describes a random motion in a disordered medium. We consider RWRE on the d -dimensional lattice. The jump probabilities are themselves random variables, creating thus a "random environment" for the walker. More specifically, we only allow nearest neighbor jumps, and we assume that the $2d$ -dimensional vectors of jump probabilities are independent and identically distributed.

The increments of this walk are not stationary, since they depend on the location of the walker. To overcome this difficulty, one can average out the randomness carried by the jump probabilities. This restores some stationarity, but destroys the Markov property (i.e. the future evolution of the walk depends on its past). This makes the model interesting, and challenging. Although the one-dimensional model is well understood by now, embarrassingly simple questions remain unanswered in higher dimensions. We state some problems and open questions, and explain recent results obtained in the regime of walks with non-vanishing velocity.