SOLIDIFICATION ESTIMATES FOR RANDOM WALKS ON SUPERCRITICAL PERCOLATION CLUSTERS

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We consider the simple random walk on the infinite cluster of supercritical Bernoulli bond percolation on the integer lattice in dimension larger or equal to three. For almost every realization of the percolation configuration, we obtain uniform bounds on the absorption probability of the walk by "porous interfaces" surrounding the discrete blow-up of a compact set. Our proof relies on a fine analysis of the regularity of heat kernels and the relative volume of the cluster over well-separated scales, allowing the construction of a "resonance set". This method is robust and also applies to the infinite cluster of various correlated percolation models in their supercritical phases. Our estimates extend previous controls obtained for Brownian motion (in a joint work with A.-S. Sznitman) and for the random walk among random, uniformly elliptic conductances on the integer lattice (in a joint work with A. Chiarini) to a manifestly non-elliptic set-up. Such solidification-type estimates and related capacity bounds have been instrumental for proving sharp bounds for various large deviation-type problems in correlated percolation models.

Based on joint work in progress with A. Chiarini (University of Padova) and Z. Liu (The Hong Kong University of Science and Technology).