Relaxation time of East models in d-dimensions.

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Abstract:
We study the relaxation time of natural generalizations to arbitrary dimensions of the one dimensional East process. These facilitated models are supposed to catch some of the main features of the complex dynamics of fragile glasses.
We focus on the low temperature regime i.e. small density of the facilitating sites. Using renormalization group ideas and electrical networks methods, we are able to pin down the correct temperature asymptotics of the relaxation time. Our results contradict the "quasi-one-dimensional" assumption on the relaxation process of these models made in the physical literature and confirm previous MCAMC (Monte Carlo with Absorbing Markov Chains) simulations. We also show a dramatic dependence on the boundary conditions, yet another indication of key dimensional effects. Our final result is related to the out-of-equilibrium dynamics. Starting with a single facilitating site at the origin, we show that, up to the equilibrium length scale, its influence propagates much faster (on a logarithmic scale) along the diagonal direction than along the axes directions.
Joint work with. P. Chleboun and A. Faggionato