

Hydrodynamical Behavior of Symmetric Exclusion with Slow Bonds

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Abstract :

Consider the exclusion process in the one-dimensional discrete torus with N points, where all the bonds have conductance one, except a finite number of slow bonds, with conductance $N^{-\beta}$, where β is a positive number. We prove that the time evolution of the empirical density of particles, in the diffusive scaling, has three distinct behaviours according to β . If $\beta < 1$, the hydrodynamic limit is given by the usual heat equation. If $\beta = 1$, it is given by a parabolic equation involving an operator $(d/dx)(d/dW)$, where W is the Lebesgue measure on the torus plus a sum of Dirac measures. If $\beta > 1$, it is given by the heat equation with Neumann's boundary conditions, meaning no passage through the slow bonds in the continuum.

Joint work with Patrícia Gonçalves (Universidade do Minho) and Adriana Neumann (UFRGS).