

Induced long-range correlations in a two-component lattice gas

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It is shown that distinguishability of at least two species of particles in the classical lattice gas model with no interactions except hard core exclusion entails additional interparticle correlations. A nonlinear mixing flow appears which manifest itself most pronounced in the case of significant difference between mobilities of species and may lead to drag effect, memory effect and induced correlations for slow subsystem mediated by fast one. In the adiabatic approximation these correlations may appear only in a non-equilibrium situation, when the flow of the fast component is present in the system. It is demonstrated in quasi-one-dimensional case that long-time correlations of unbounded range occur for slow component. Another limiting case of the adiabatic approximation corresponds to the dynamics of the mobile component in the static distribution of another and comes to the advection-diffusion with anomalous transport effects.