ON HYDRODYNAMIC LIMIT FOR SIMPLE EXCLUSION PROCESS WITH DEGENERATE RATES

YUKIO NAGAHATA

Simple exclusion process with degenerate rates is one of the simplest system called *kinetically constrained lattice gases*, which have been introduced in the physical literature as simplified models for some peculiar phenomena of the "glassy" dynamics.

Let us consider discrete torus $T_n = \{1, 2, \dots n\}$ (n is identified with 0). We define the set of configurations by $\Sigma_n := \{0,1\}^{T_n}$, the set of configurations conditioned by the number of particles by $\Sigma_{n,k} := \{\eta \in \Sigma_n; \sum_{x\in T_n} \eta_x = k\}$.

For $\eta \in \Sigma_n$ and $x, y \in T_n$, we define the configuration $\eta^{x,y} \in \Sigma_n$ by $(\eta^{x,y})_x = \eta_y$, $(\eta^{x,y})_y = \eta_x$, and $(\eta^{x,y})_z = \eta_z$ for $z \neq x, y$, and the operator $\pi^{x,y}$ by $\pi^{x,y} f(\eta) = f(\eta^{x,y}) - f(\eta)$. We set $c(\eta) := \eta_{-1} + \eta_2$. Let τ_x be a shift operator. Given a local function g, which is strictly positive and does not depend on the value of η_0 nor η_1, we define the generator of simple exclusion process with degenerate rate $L = L_g$ by

$$Lf(\eta) = \sum_{x\in T_n} \tau_x(c(\eta)g(\eta))\pi^{x,x+1} f(\eta)$$

for all local function f.

This model is "non-gradient" type. To establish the hydrodynamic limit for non-gradient model, "gradient replacement" lemma plays a key role. I will talk on "gradient replacement" lemma for this model.

Department of Information Engineering Faculty of Engineering, Niigata University, JAPAN
nagahata@ie.niigata-u.ac.jp.