

Martingales on the Group of Diffeomorphisms of flat n -dimensional Torus

Yuri E. Gliklikh*, Voronezh State University, Universitetskaya pl. 1,
394018 Voronezh, Russian Federation
e-mail yglyklikh@gmail.com

We study stochastic processes on the group of Sobolev diffeomorphisms of the flat n -dimensional torus \mathcal{T}^n that satisfy a second order stochastic differential equation with backward mean derivatives and a certain relation between their first order backward mean derivatives and symmetric mean derivatives. From the relation it follows that those processes are martingales. Those equation and relation have the following form:

$$D_* D_* \xi(t) = \bar{F},$$

$$D_* \xi(t) = 2D_S \xi(t),$$

where D_* is the backward mean derivative and D_S is the symmetric mean derivative.

We deal with two special martingales on \mathcal{T}^n given in terms of Ito integrals with respect to the Wiener process $w(t)$. We transform those martingales into the corresponding martingales in the group H^s Sobolev diffeomorphisms of \mathcal{T}^n for $s > \frac{n}{2} + 2$.

Theorem 1 *The martingales on the group of diffeomorphisms under consideration generate flows of special non-Newtonian fluids on \mathcal{T}^n satisfying analogs of Burgers equation and analogs of the continuity equations.*

*Corresponding author