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On nonuniform averages of stochastic flows in the ergodic theorem.

Consider a non-uniform averagings of the form

$$F_t(x) = \int_0^{\infty} f(T_{ts})\rho(s)\, ds$$

for an ergodic dynamical system $T_t, t \geq 0$ on a probability space (X, μ), where ρ is a probability density on $[0, +\infty)$. Consider a stochastic DE $d\xi_t^x = A(\xi_t^x)dw_t + b(\xi_t^x)dt$, $\xi_0^x = x$. Suppose that μ is the corresponding T_t-invariant probability measure, $f \in L_p(\mu)$, $\nu = \rho(s)ds$, where $\rho \in L_q[0, +\infty)$ is a probability density.

Suppose also that one of the following conditions is fulfilled: (1) the density ρ has bounded support in the interval $[a, b]$; (2) $p > 1$ and there exists a nondecreasing function β on $[0, +\infty)$ such that $\beta \geq 0, \beta \in L_q[0, +\infty)$ and $\rho(t) \leq \beta(t)$ on $[t_0, +\infty)$ for some t_0. Then, for every $x \in X$, for P-almost all $w \in W$ and a certain assumptions on A and b one has the following averaging result:

$$\lim_{T \to \infty} \int_0^{+\infty} f(\xi_{ts}^x(w))\rho(s)\, ds = \int_X f\, d\mu$$

The detailed analysis is given in [1],[2].

References

1. *Bogachev V.I., Korolev A.V. On the ergodic theorem in the Kozlov-Treshchev form. Dokl. Math., 2007, N 1, pp. 47-52.*

2. *Bogachev V.I., Korolev A.V., Pilipenko A.Yu., Non uniform averages in ergodic theorem for stochastic flows. Dokl. Akad. Nauk, 2009, vol. 432, N 4, pp. 439-442.*

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