Homogenization of Random Trajectory Attractors to Evolutionary Equations

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In this talk we consider autonomous and non-autonomous 3D Navier-Stokes systems (see [**?**]) and we assume that the right–hand sides $g\left(x, \frac{x}{\varepsilon}, \omega\right)$ or $g\left(x, \frac{t}{\varepsilon}, \omega\right)$ of the systems are random functions, which oscillates rapidly with respect to the spatial or time variables. Here ω is an element of a standard probability space $(\Omega, \mathcal{B}, \mu)$. The parameter $\varepsilon > 0$ characterizes the oscillation frequency.

In the second part of the talk we study asymptotic behavior of trajectory attractors of autonomous reaction–diffusion systems (see [**?**]) with randomly oscillating terms (the right–hand side and the reaction coefficient).

Along with such systems we also consider the corresponding homogenized 3D Navier–Stokes system with external force $g^{hom}(x)$, where $g^{hom}(x)$ is the mathematical expectation of $g\left(x, \frac{x}{\varepsilon}, \omega\right)$ or $g\left(x, \frac{t}{\varepsilon}, \omega\right)$ as $\varepsilon \to 0$, and the respective homogenized reaction–diffusion system with similar terms.

We prove that the trajectory attractor $\mathfrak{A}_\varepsilon$ of the system with randomly oscillating term converges almost surely as $\varepsilon \to 0$ to the trajectory attractor $\overline{\mathfrak{A}}$ of the homogenized system in an appropriate functional space.

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References

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