APPLICATION OF STOCHASTIC SENSITIVITY FUNCTION TECHNIQUE TO THE STUDY OF PATTERNS IN SPATIALLY EXTENDED REACTION-DIFFUSION SYSTEMS

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In this report we consider a spatially extended stochastic reaction-diffusion model. It is known that in the zone of diffusion instability such models form stationary spatially non-homogeneous structures (patterns). Due to multistability of the system the number of these patterns can be large. Under the effect of random perturbations some patterns appear to remain relatively stable, while others dissipate. The noise-induced transition phenomenon implies that different patterns have different levels of stochastic sensitivity.

The main focus of this report is the description of this sensitivity of spatial patterns. A scenario of noise-induced transition between coexisting patterns is investigated. For these patterns dispersion of random states is studied. It is shown that the less sensitive pattern has lower deviations. Finally, the stochastic sensitivity function technique shows that deviation of the random states can be estimated analytically [1]. The possibility of constructive application of this approach is discussed on examples.

References

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