Kinetic Equations of Soft Active Matter

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We develop an approach to the description of collective behavior of large number of interacting constituents (entities) of mathematical biology within the framework of the evolution of marginal observables of these systems [1]. Such representation of the kinetic evolution seems in fact the direct mathematically fully consistent formulation modeling collective behavior of biological systems, since the notion of state is more subtle and implicit characteristic of living entities.

Using suggested approach, we derive the non-Markovian kinetic equation for a system of interacting stochastic Markivian processes modeling the evolution of soft active matter. For such systems we verify the kinetic equation in mean field scaling limit and we establish the property of the propagation of initial chaos in soft active matter.

The obtained results are applied to the problem of the description of the typical hemokinetic properties of the blood flows.

[1] V.I. Gerasimenko, Yu.Yu. Fedchun, J. Coupled Syst. Multiscale Dyn. **1**, (2), (2013), p. 273–279.