Global solution to Cauchy problem of fractional drift diffusion system with power-law nonlinearity

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Abstract

In this paper we consider the global existence, regularizing-decay rate and asymptotic behavior of mild solutions to the Cauchy problem of fractional drift diffusion system with power-law nonlinearity. Using the properties of fractional heat semigroup and the classical estimates of fractional heat kernel, we first prove the global-in-time existence and uniqueness of the mild solutions in the frame of mixed time-space Besov space with multi-linear continuous mappings. Then we show the asymptotic behavior and regularizing-decay rate estimates of the solution to equations with power-law nonlinearity by the method of multi-linear operator and the classical Hardy-Littlewood-Sobolev inequality.

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