

Quantitative particle approximation of nonlinear stochastic Fokker-Planck equations with singular kernel

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We derive quantitative estimates for large stochastic systems of interacting particles perturbed by both idiosyncratic and environmental noises, as well as singular kernels. We prove that the (mollified) empirical process converges to the solution of the nonlinear stochastic Fokker-Planck equation. The proof is based on Itô's formula for H_q^1 -valued process, commutator estimates, and some estimations for the regularization of the empirical measure. Moreover, we show that the aforementioned equation admits a unique strong solution in the probabilistic sense. The approach applies to repulsive and attractive kernels.

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