

Fractional McKean–Vlasov and Hamilton–Jacobi–Bellman–Isaacs Equations

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Abstract—We study a class of abstract nonlinear fractional pseudo-differential equations in Banach spaces that includes both the McKean–Vlasov type equations describing nonlinear Markov processes and the Hamilton–Jacobi–Bellman–Isaacs (HJB–Isaacs) equations of stochastic control and games. This approach allows us to develop a unified analysis of these equations. We establish their well-posedness in the sense of classical solutions and prove the continuous dependence of the solutions on the initial data. The obtained results are extended to the case of generalized fractional equations.

Keywords: fractional McKean–Vlasov type equations, fractional HJB–Isaacs equations, mild solutions, classical solutions, Caputo–Djrbashian fractional derivative, generalized fractional derivatives.

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