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Forward-backward SDEs with jumps and classical solutions to nonlocal quasilinear parabolic PDEs

Abstract

We obtain an existence and uniqueness theorem for fully coupled forward-backward SDEs (FBSDEs) with jumps via the classical solution to the associated quasilinear parabolic partial integro-differential equation (PIDE), and provide the explicit form of the FBSDE solution. Moreover, we embed the associated PIDE into a suitable class of non-local quasilinear parabolic PDEs which allows us to extend the methodology of Ladyzhenskaya et al (O. Ladyzenskaja, V. Solonnikov, N.N. Uralceva. Linear and Quasi-Linear Equations of Parabolic Type, 1968) to non-local PDEs of this class. Namely, we obtain the existence and uniqueness of a classical solution to both the Cauchy problem and the initial-boundary value problem for non-local quasilinear parabolic second-order PDEs.