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Stochastic variational inequalities for weakly differentiable processes

Abstract

In this talk, I will describe stochastic variational inequalities for Snell envelopes based on adapted continuous processes X under some weak functional differentiability assumptions. In the Markovian case, it is well-known (El Karoui et al (1997. AOP)) there exists a closed relation between reflected backward stochastic differential equations (in particular Snell envelopes) and variational inequalities for semilinear parabolic PDEs. In the general non-Markovian case, we show that the Snell envelope is the unique solution of variational inequalities where usual PDEs are replaced by functional random differential equations in a weak sense. Our concept of solution is similar in spirit to the classical notion of good solutions which turns out to be equivalent to viscosity-type solutions in the finite-dimensional case. Applications to optimal stopping problems driven by fractional Brownian motion will be presented.