Graduate

Probability Seminar

Non-Markovian Stochastic Control

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Abstract. In this talk, we present a general methodology for stochastic control problems driven by the Brownian motion filtration including non-Markovian and non-semimartingale state processes controlled by mutually singular measures. The main result is the development of a numerical scheme for computing near-optimal controls associated with controlled Wiener functionals via a finite-dimensional approximation procedure. The theory does not require functional differentiability assumptions on the value process and ellipticity conditions on the diffusion components. Explicit rates of convergence are provided under rather weak conditions for distinct types of non-Markovian and non-semimartingale states. The analysis is carried out on suitable finite dimensional spaces and it is based on the weak differential structure introduced by the authors in previous works. The theory is applied to stochastic control problems based on path-dependent SDEs and rough stochastic volatility models, where both drift and possibly degenerated diffusion components are controlled. Optimal control of drifts for nonlinear path-dependent SDEs driven by fractional Brownian motion with exponent $H \in (0, 1)$ is also discussed. Finally, we present a simple numerical example to illustrate the method.