学术报告

2023
MATHEMATICS

Stochastic control for stochastic differential equations driven by sub-diffusions and its applications

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摘要： In this talk, we study optimal stochastic control problems for stochastic systems driven by non-Markov sub-diffusion, which have the mixed features of deterministic and stochastic controls. We obtain stochastic maximum principles (SMP) for these systems using both convex variational and spike methods, depending on whether the convex domain is convex or not. To derive SMP, we first establish martingale representation theorem for sub-diffusions *BLt* , and then use it to derive the existence and uniqueness result for the solutions of backward stochastic differential equations (BSDEs) driven by sub-diffusions, which may be of independent interest. Then we explore the SMP with switching between sub-diffusion and Brownian motion. We also study the dynamic programing principle for sub-diffusion and obtain the HJB-equations. The HJB equations has two parts: the interior and the boundary parts and the boundary part involves fractional derivative due to the sub-diffusive nature. Furthermore, we prove that the value function is the unique viscosity solution of the HJB equations. At last, application to two examples, a linear control problem and a mean variance portfolio selection problem, are given to illustrate the main results.

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时间：2023年6月20日 16：30—17：30

地点：文萃楼G124

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