



北京理工大学

数学与统计学院学术报告

Optimal Control of SDEs with merely measurable drift: an HJB approach

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摘要: We investigate an optimal control problem for a diffusion whose drift and running cost are merely measurable in the state variable. Such low regularity rules out the use of Pontryagin's maximum principle and also invalidates the standard proof of the Bellman principle of optimality. We address these difficulties by analyzing the associated Hamilton–Jacobi–Bellman (HJB) equation. Using PDE techniques together with a policy iteration scheme, we prove that the HJB equation admits a unique strong solution, and this solution coincides with the value function of the control problem. Based on this identification, we establish a verification theorem and recover the Bellman optimality principle without imposing any additional smoothness assumptions. We further investigate a mollification scheme. It turns out that the smoothed value functions may fail to converge to the original value function, and we provide an explicit counterexample. To resolve this, we identify a structural condition on the control set. When the control set is countable, the convergence holds locally uniformly.

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