Hong Kong Consortium of Quantitative Finance

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Hong Kong Quantitative Finance Series

Itô's Formula for Semimartingales on Flows of Probability Measures

Professor Xin Guo, University of California, Berkeley

Abstract

Itô's formula is of critical importance for financial mathematics and financial engineering. Recent development of mean-field theory has led to research interest in Itô's formula on flow of measures. In this talk, we present Itô's formula along a flow of probability measures associated with general semimartingales. This extends recent existing results for flow of measures on Itô processes. Our approach is to first prove Itô's formula for cylindrical polynomials and then use function approximation for the general case. Some applications to McKean-Vlasov controls of jump-diffusion processes and McKean-Vlasov singular controls are developed. In particular, we generalize the classical relation between the maximum principle and the dynamic programming principle to the McKean-Vlasov control setting, where the adjoint process is expressed in terms of the Wasserstein derivative of the value function.

Based on joint work with H. Pham and X. L. Wei.

About the speaker

Dr. Xin Guo is currently the Coleman Fung Chair Professor at the department of industrial engineering and operations research at UC Berkeley, and an Amazon scholar. Prior to UC Berkeley, she worked for IBM research center and Cornell. Her research interests are stochastic controls and games, theory of machine learning, with applications including financial engineering and technology, supply chain management, and medical data analysis.

Date
17 May 2021 (Monday)

Time
11:00 – 12:00 (HK Time)

Zoom
https://polyu.hk/EOwWj