



福建師範大學
FUJIAN NORMAL UNIVERSITY

随机分析及其应用国际研讨会

会

议

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2022 年 12 月 3 日-12 月 4 日

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会议日程

腾讯会议 ID: 931 4964 7496

时间	12月3日(周六)	12月4日(周日)
主持人	王健	吕克宁
08: 20-08: 30	开幕式	陈本法
08: 30-09: 10	吕克宁	
09: 10-09: 50	董昭	张希承
主持人	董昭	张希承
10: 00-10: 40	吴臻	宋仁明
10: 40-11: 20	陈振庆	谢颖超
11: 20-12: 00	郭先平	王风雨
主持人	郭先平	黄璐静
14: 30-15: 10	张立新	陈娴
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16: 00-16: 40	吴黎明	自由讨论
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12 月 3 日(周六)

主持人: 王 健

08:20-08:30 开幕式: 王长平校长致辞

08:30-09:10 吕克宁(四川大学)

报告题目: Ergodicity, mixing, limit theorems for quasi-periodically forced 2D stochastic Navier-Stokes equations

摘要: We consider the incompressible 2D Navier-Stokes equations on the torus driven by a deterministic time quasi-periodic force and a noise that is white in time and extremely degenerate in Fourier space. We show that the asymptotic statistical behavior is characterized by a uniquely ergodic and exponentially mixing quasi-periodic invariant measure. The result is true for any value of the viscosity $\nu > 0$. By utilizing this quasi-periodic invariant measure, we show the strong law of large numbers and central limit theorem for the continuous time inhomogeneous solution processes. Estimates of the corresponding rate of convergence are also obtained, which is the same as in the time homogeneous case for the strong law of large numbers, while the convergence rate in the central limit theorem depends on the Diophantine approximation property on the quasi-periodic frequency and the mixing rate of the quasi-periodic invariant measure. We also prove the existence of a stable quasi-periodic solution in the laminar case (when the viscosity is large). This talk is based on a joint work with Liu Rongchang.

09:10-09:50 董昭(中科院数学与系统科学研究所)

报告题目: Stability of rarefaction for stochastic viscous conservation law

摘要: It was proved in [9] that the rarefaction wave for the stochastic Burgers equation with transport noise [14] is time- asymptotically stable. This paper is concerned with more general flux, viscosity and conservative noise. By manipulating the weakly monotone methods, we prove the global well-posedness of strong solutions for general H^1 initial data. Furthermore, we show that the rarefaction wave is still time-asymptotically stable for general stochastic viscous conservation laws with L^p time. This is the joint work with Fei min Huang and Houqi Su.

09:50-10:00 休息

主持人: 董昭

10:00-10:40 吴臻(山东大学)

报告题目: Maximum principle for discrete-time stochastic optimal control problems and its applications

摘要: In this talk, we introduce maximum principle for discrete-time stochastic optimal control problems and its applications. We first give one kind of discrete-time stochastic optimal control problem with convex control domains, for which necessary condition in the form of Pontryagin's maximum principle and sufficient condition of optimality are derived. Then we extend these results to one kind of discrete-time mean-field type stochastic optimal control problem, in which a technique of adjoint operator is used to overcome the difficulties of obtaining adjoint equations and duality relation. It is worth mentioning that we can remove the higher-order integrability assumption on controls and noises in this talk. Besides, a discrete-time mean-variance portfolio selection problem is presented to illustrate the applications of the theoretical results. The purpose of this talk is to establish a rigorous version of discrete-time stochastic maximum principle in a clear way and pave a road for further related research topics. The talk is based on the works of Z. Wu, F. Zhang, *MCRF*, 2022 and B. Dong, T. Nie, Z. Wu, *Automatica*, 2022.

10:40-11:20 陈振庆(华盛顿大学, 美国)

报告题目: Cylindrical stable processes

摘要: A cylindrical α -stable process on \mathbb{R}^d is a Levy process whose coordinate processes are independent copies of one-dimensional α -stable processes. They have many distinct properties from that of isotropic stable processes. In this talk, I will first present a geometric characterization of an open subset so that the part process X^D of X killed upon leaving D is irreducible, and show that this is equivalent to the strict positivity of its transition density function $p_D(t, x, y)$. I will then present results on the properties of $p_D(t, x, y)$ including its regularity as well as its sharp two-sided bounds for $C^{1,1}$ open set D . Our bounds are shown to be sharp for a class of $C^{1,1}$ open sets. Based on joint work with Eryan Hu and Guohuan Zhao.

11:20-12:00 郭先平(中山大学)

报告题目: Optimal stopping time on semi-Markov processes—An approach of SMDPs

摘要: This talk concerns with optimal stopping problems on semi-Markov processes (SMPs) with finite horizon, and aims to establish the existence and computation of optimal stopping times. We first establish the existence of an optimal policy of the semi-Markov decision processes (SMDPs) with additional terminal costs and finite horizon. Based on the optimal stopping problems, we give an explicit construction of SMDPs, which are proven to be equivalent to the optimal stopping times of SMPs. Then, using the results of SMDPs developed here, we not only prove the existence of an optimal stopping time of SMPs, provide an algorithm for computing them, but also find that the optimal stopping times can be characterized by the hitting time of some special sets. Finally, we give an example to illustrate the effectiveness of our conclusions.

主持人: 郭先平

14:30-15:10 张立新(浙江大学)

报告题目: Borel-Cantelli lemma and strong convergence under sub-linear expectations

摘要: In this talk we consider the strong convergence of independent random variables under Peng's framework of sub-linear expectations. We show that if the sub-linear expectation space is rich enough, it will have no continuous capacity. A new Borel-Cantelli lemma is established under a popular regular condition on the sub-linear expectation and the sufficient and necessary conditions are given for strong law of large numbers.

15:10-15:50 张士生(中国科学技术大学)

报告题目: Reflected stochastic evolution equations

摘要: In this talk, I will present a recent work on the well-posedness of reflected stochastic evolution equations in an infinite dimensional domain. Penalized methods play an important role.

15:50-16:00 休息

主持人: 王凤雨

16:00-16:40 吴黎明(法国UCA大学, 哈尔滨工业大学)

报告题目: 平均场交互作用粒子系统的泛函不等式

摘要: 在这个报告中我将介绍 Gibbs 平均场在 Dobrushin 唯一性条件下的 Poincaré 和对数 Sobolev 不等式. 我们将用它们去证明 McKean-Vlasov 方程熵意义下的指数收敛性, 去掉 Carrillo-McCann-Villani 相应工作中的凸假设. 顺便我们介绍一二个例子. 这个报告基于和 Guillin, 刘伟, 张朝恩发表在 AAP(2021)的工作.

16:40-17:20 李向东(中科院数学与系统科学研究所)

报告题目: On the Fokker-Planck-Kramer-Vlasov equation on tangent bundle over Riemannian manifolds

摘要: In this talk, I will present some recent progress of the study on the Fokker-Planck-Kramer-Vlasov equation on tangent bundle over Riemannian manifolds. Joint work with my PhD student Rong Lei.

12 月 4 日(周日)

主持人: 吕克宁

08:20-09:10 陈木法(江苏师范大学)

报告题目: 华罗庚经济优化理论与马氏链

摘要: 我们介绍华老本人的探索和我们的继续. 关于前者, 概述华老仙逝前的重要更新, 该结果不幸沉睡了 36 年, 直到一年前才被唤醒. 关于后续进展, 有一次修正、一次再更新和五项新发展: 稳定性分析的新方法; 产品(产业)等级(排序); 预测与调整; 经济结构的优化; 重排序与大矩阵主特征值(及前 6 个)的高效算法. 难得的是: 多种变换给出了完全相同的非稳定的时间和产品. 早年关于华氏经济崩溃定理的证明基于马氏链的遍历定理, 最近的全部结果基于马氏链的转移概率矩阵. 也许可视为经济优化研究的新路子. 这些成果已被应用于我国一个省级和五个国家级投入产出表, 检验了理论的合理性和可靠性.

09:10-09:50 张希承(北京理工大学)

报告题目: Second order fractional mean-field SDEs with very singular kernels

摘要: In this work we establish the local and global well-posedness of weak and strong solutions for second order fractional mean-field SDEs with singular interaction kernels including Newtonian or Coulomb potential, Riesz potential, Biot-Savart law, etc. Moreover, we also show the smoothness and the short time singularity and long time decay estimate of the density. Our results reveal a phenomenon that for nonlinear mean-field equations, the regularity of the initial density could balance the singularity of the kernel. The quantitative relationship between the singularity of the kernel and the regularity of the initial values are calculated. In scaling sense, they are sharp. In particular, our results provide microscopic probability explanation and establish a unified treatment for many physical models such as Vlasov-Poisson-Fokker-Planck system, 2d-stochastic vortex system, surface quasi-geostrophic models, fractional porous media equation with viscosity, etc. (This is an ongoing work with Zimo Hao.)

09:50-10:00 休息

主持人: 郭先平

10:00-10:40 宋仁明(伊利诺伊大学, 美国)

报告题目: Heat kernel estimates for Dirichlet forms degenerate at the boundary

摘要: In this talk I will present some recent results on sharp two-sided heat kernel estimates for non-local operators with jump kernels degenerate at the boundary. The corresponding processes can be either conservative or non-conservative. This talk is based a joint paper with Soobin Cho, Panki Kim and Zoran Vondracek.

10:40-11:20 谢颖超(江苏师范大学)

报告题目: Averaging principle for slow-fast stochastic systems

摘要: This talk introduces our recent results on the averaging principle for slow-fast stochastic system. More precisely, it covers a class of slow-fast SDEs, SPDEs and McKean-Vlasov SDEs. Some results give the optimal convergence order.

11:20-12:00 王风雨(天津大学)

报告题目: 非对称扩散过程经验分布的 Wasserstein 极限

摘要: 对于紧流形上非对称扩散过程的经验分布, 刻画了关于任意阶 Wasserstein 距离的收敛速度, 并在不高于三维情形给出在 2 阶 Wasserstein 距离下的精确极限, 从而显式描述了零散度扰动对收敛性的加速效应.

主持人: 黄璐静

14:30-15:10 **陈娴(厦门大学)**

报告题目: Nonzero-sum risk-sensitive average stochastic games

摘要: We study discrete-time nonzero-sum stochastic games under the risk-sensitive average cost criterion. The state space is a denumerable set, the action spaces of players are Borel spaces, and the cost functions are unbounded. Under suitable conditions, we first introduce the risk-sensitive first passage payoff functions and obtain their properties. Then, we establish the existence of a solution to the risk-sensitive average cost optimality equation of each player for the case of unbounded cost functions and show the existence of a randomized stationary Nash equilibrium in the class of randomized history-dependent strategies. This is a joint work with Qingda Wei.

15:10-15:50 **刘群(闽南师范大学)**

报告题目: The SK model with vector spins

摘要: 报告将首先介绍 SK 模型的背景和发展经历, 然后我将介绍向量值 SK 模型的一些应用及其与传统 SK 模型的联系和区别; 之后将介绍近期我在向量值 SK 模型中关于自由能的波动性和 TAP 方程的一些结果; 最后, 介绍量子化 SK 模型和向量值 SK 模型的联系及在量子化 SK 模型遇到的困难和挑战.

主持人: 方榕娟

15:50-17:20 **自由讨论**