

Sunday, December 17

Name: Deng, Yu 邓煜 (Courant Institute of Mathematical Sciences)

9:30-10:10

Title: Spacetime resonance and asymptotic behavior for wave equations

Abstract: We apply the method of spacetime resonance, developed by Germain-Masmoudi-Shatah, to study the asymptotic behavior for small solutions to 3+1 dimensional wave equations, and justify the ideas behind a conjecture of Lindblad and Rodnianski. This is joint work with F. Pusateri.

Name: Jiang, Yan 蒋琰 (Michigan State University)

10:25-11:05

Title: A kernel-based high order numerical scheme

Abstract: In this talk, I will introduce a novel numerical scheme, in which the spatial derivatives are represented as a special kernel based formulation of the solutions. We use this method to solve the nonlinear advection-diffusion equations and Hamilton-Jacobi equations. Moreover, theoretical investigations indicated that the proposed scheme is A-stable up to third order accuracy when combining with the SSP-RK scheme.

Name: Zhao, Xiaolei 赵晓磊 (Northeastern University)

11:20-12:00

Title: Moduli spaces of sheaves, birational geometry and stability conditions

Abstract: Moduli space is a central object in algebraic geometry, whose construction usually relies certain stability. I will explain how to construct minimal models of moduli of sheaves by varying stability conditions, and to use this to study linear series on these moduli spaces.

Name: Cao, Junyan 曹俊彦 (University Paris 6)

13:30-14:10

Title: A decomposition theorem for projective manifolds with nef anticanonical bundle

Abstract: Let X be a simply connected projective manifold with nef anticanonical bundle. We prove that X is a product of a rationally connected manifold and a manifold with trivial canonical bundle. As an application we describe the MRC fibration of any projective manifold with nef anticanonical bundle. It is a joint work with Andreas Höring.

Name: Fang, Hanlong 方汉隆 (Rutgers University)

14:25-15:05

Title: Flattening a non-degenerate CR singular point of real codimension two

Abstract: We continue the previous studies in two papers of Huang-Yin on the flattening problem of a CR singular point of real codimension two sitting in a submanifold in \mathbb{C}^{n+1} with $n + 1 \geq 3$, whose CR points are non-minimal. We give a very general flattening theorem for a non-degenerate CR singular point. This is joint work with Xiaojun Huang.

Name: Han, Bangxian 韩邦先 (University of Bonn)

15:20-16:00

Title: Characterizations of monotonicity of vector fields on metric measure space

Abstract: We characterize the convexity of functions (and monotonicity of vector fields) on metric measure space, so that we could link the existence of some special K-convex functions to the particular metric structure of the space, which is a new approach to deal with some rigidity theorems such as "splitting theorem" and "volume cone implies metric cone theorem".

Name: Wang, Ke 王可 (HKUST)

16:15-17:00

Title: Eigenvectors of random matrices

Abstract: Eigenvectors of large matrices and graphs play an essential role in combinatorics and theoretical computer science. For instance, many properties of a graph can be deduced or estimated from its eigenvectors. It is conjectured that an eigenvector of a random symmetric matrix behaves like a random vector uniformly distributed on the unit sphere. I will talk about some recent partial results toward confirming this conjecture.

Monday, December 18

Name: Qi, You 漆游 (California Institute of Technology)

9:30-10:10

Title: Categorification at prime roots of unity

Abstract: We sketch an algebraic approach to categorification of quantum groups at a prime root of unity, with the outlook towards eventually categorifying Witten-Reshetikhin-Turaev 3-manifold invariants. Based on joint work with B. Elias, M. Khovanov and J. Sussan.

Name: Li, Chao 李超 (Columbia University)

10:25-11:05

Title: Goldfeld's conjecture and congruences between Heegner points

Abstract: Given an elliptic curve E over \mathbb{Q} , a celebrated conjecture of Goldfeld asserts that a positive proportion of its quadratic twists should have rank 0 (resp. 1). We report some recent progress (with D. Kriz) on Goldfeld's conjecture using congruences between Heegner points.

Name: Wu, Xiaolei 伍晓磊 (University of Bonn)

11:20-12:00

Title: On the Farrell-Jones Conjecture

Abstract: Farrell-Jones Conjecture plays an important role in manifold topology. It implies for example the Novikov Conjecture and Borel Conjecture. In this talk I will give a overview of the conjecture with special emphasis on the K-theory version. I will first give an gentle introduction to algebraic K-theory and discuss the connections with manifold topology. We then formulate the conjecture and discuss the status of it. I will also discuss some ideas on proving the conjecture in some special cases.

Name: Lu, Ding 鲁玓 (University of Geneva)

13:30-14:10

Title: Real structured pseudospectra and eigenvalue optimization

Abstract: The real structured ϵ -pseudospectrum of a real matrix A consists of the eigenvalues of all real matrices that are ϵ -close to A . In this talk, we will introduce a criss-cross method to compute the rightmost point in the real pseudospectra. This method is based on a superset characterization of real pseudospectra, and it has proven global convergence. In the second part of the talk, we will combine criss-cross with a subspace projection scheme to solve large-scale problems. This leads to a locally superlinearly convergent algorithm. The same subspace framework can also be extended to large scale univariate eigenvalue optimization. There we can show more: the convergence order will be $1+\sqrt{2}$. A number of numerical experiments confirm our theoretical results and reveal that the established convergence order appears to be tight.

Name: Yao, Jing 姚经 (Vrije Universiteit Brussel)

14:25-15:05

Title: A Stein's type Lemma for the Multivariate Generalized Hyperbolic Distribution

Abstract: For two bivariate normally distributed random variables, Stein's seminal lemma provides a convenient expression for the covariance of the first variable with a function of the second. It has shown to be useful in various disciplines. In finance, however, asset returns do not always display symmetry but may exhibit skewness. In this paper, we develop a new Stein's type lemma in the setting of a mean-variance mixture model for returns. As a particular application, we show that expected utility maximizers select portfolios that are mean-variance-skewness efficient.

Tuesday, December 19

Name : Chen, Nan 陈南 (Courant Institute of Mathematical Sciences)

9:30-10:10

Title: A conditional Gaussian framework for data assimilation and prediction of nonlinear turbulent dynamical systems

Abstract: We introduce a conditional Gaussian framework for data assimilation and prediction of nonlinear turbulent dynamical systems. The talk will include 1) a physics-constrained nonlinear stochastic model in predicting the Madden-Julian oscillation indices with strongly intermittent features, 2) data assimilation of multiscale and turbulent ocean flows using noisy Lagrangian tracers, and 3) solving high-dimensional Fokker-Planck equation with highly non-Gaussian features.

Name: Fu, Guosheng 傅国生 (Brown University)

10:25-11:05

Title: Discontinuous Galerkin methods for elliptic and hyperbolic equations

Abstract: We present the discontinuous Galerkin (DG) finite element methods for partial differential equations of elliptic and hyperbolic types. We first talk about convergence of the method for diffusion problems. Then, we focus on the DG method for the compressible Euler equations with some new ingredients to make it more attractive.

Name: Yan, Ming 严明 (Michigan State University)

11:20-12:00

Title: Primal-dual algorithms for the sum of two and three functions

Abstract: In this talk, I will introduce a primal-dual algorithm for minimizing $f(x)+g(x)+h(Ax)$, where f is differentiable. It recovers Chambolle-Pock ($f=0$) and PAPC ($g=0$), and enjoys all advantages of existing algorithms for solving the same problem. Then I will show its applications in decentralized consensus optimization.

Name: Gao, Hui 高辉 (University of Helsinki)

13:15-13:55

Title: Overconvergence of Galois representations

Abstract: Galois representations are important objects in algebraic number theory, and p -adic Hodge theory is a useful tool to study them. In this talk, we discuss about a certain overconvergence property of (φ, τ) -modules in p -adic Hodge theory. A key idea in the proof is that we can approximate a general Galois representation by nice “geometric” Galois representations. This is a joint work with Tong Liu.

Name: Tu, Junwu 涂君武 (University of Missouri)

14:05-14:45

Title: Gromov-Witten invariants of Calabi-Yau A-infinity categories

Abstract: Classical mirror symmetry relates Gromov-Witten invariants in symplectic geometry to Yukawa coupling invariants in algebraic geometry. Through non-commutative Hodge theory, one can define categorical Gromov-Witten invariants associated to (Calabi-Yau A-infinity) categories. Conjecturally, this construction should reproduce the Gromov-Witten invariants and Yukawa coupling invariants, when applied Fukaya categories and Derived categories, respectively. In this talk, I describe a first computation of categorical Gromov-Witten invariants at positive genus. This is a joint work with Andrei Caldararu.