

数学及其应用联合学术研讨会

(Joint Workshop on Mathematics and Applications)

武汉大学数学与统计学院
(School of Mathematics and Statistics, Wuhan University)

二零一七年六月廿四日至廿六日
(24th--26th June 2017)

组织委员会 (Organizing Committee):

Hua Chen (Wuhan University)
Tao Luo (City University of Hong Kong)
Junhui Wang (City University of Hong Kong)
Tong Yang (City University of Hong Kong)
Huijiang Zhao (Wuhan University)

主要参会人员 (Main Participants):

Hua Chen (Wuhan University)
Dan Dai (City University of Hong Kong)
Wei-xi Li (Wuhan University)
Xiliang Lu (Wuhan University)
Tao Luo (City University of Hong Kong)
Chunlai Mu (Chongqing University)
Shuangjie Peng (Central China Normal University)
Junhui Wang (City University of Hong Kong)
Tao Wang (Wuhan University)
Shangkun Weng (Wuhan University)
Hua Xiang (Wuhan University)
Wei Xiang (City University of Hong Kong)
Tong Yang (City University of Hong Kong)
Xiaozhou Yang (Wuhan Institute of Physics and Mathematics)
Zhijian Yang (Wuhan University)
Huijiang Zhao (Wuhan University)
Xiaosheng Zhuang (City University of Hong Kong)

Program of the Workshop

时间	活动内容		地点	
6月24日	会议报到		君宜王朝大饭店	
6月25日	9:00-9:30	罗涛 : Some problems of fluids free boundary problems	武汉大学数学与统计学院三楼学术报告厅	
	9:30-10:00	代丹 : Asymptotics of the index distribution for the Gaussian unitary ensemble		
	10:00-10:30	向伟 : Regular Shock Reflection Diffraction Problem by Wedges		
	10:30-10:45	茶歇		
	10:45-11:15	穆春来 : Global boundedness and asymptotic behavior in a three-dimensional chemotaxis-haptotaxis model	武汉大学数学与统计学院三楼学术报告厅	
	11:15-11:45	庄晓生 : Multiscale Data Analysis: Framelets, Manifolds and Graphs		
	12:00-13:30	午餐		田园小观园
	14:30-17:30	学生见面会 1、介绍香港城市大学研究生招生情况; 2、香港城市大学的老师们介绍各自的研究方向; 3、与会的本科生和研究生简要介绍各自的情况; 4、分组自由交流		武汉大学数学与统计学院三楼学术报告厅
18:00-19:30	晚餐		田园小观园	
6月26日	9:30-10:00	杨彤 : Some Problems on Boundary Layers and High Reynolds number limits	武汉大学数学与统计学院三楼学术报告厅	
	10:00-10:30	王军辉 : Statistical Analysis of Large-scale Text Data		
	10:30-10:45	茶歇		
	10:45-11:15	彭双阶 : Existence and local uniqueness of bubbling solutions for poly-harmonic equations with critical growth	武汉大学数学与统计学院三楼学术报告厅	
	11:15-11:45	杨小舟 : 非齐次高维标量守恒律方程的光滑解全局存在的充分必要条件及相关问题		
	12:00-13:30	午餐		田园小观园
14:30-17:30	自由讨论		武汉大学数学与统计学院三楼学术报告厅	

Abstracts

Asymptotics of the index distribution for the Gaussian unitary ensemble

DAN DAI (代丹)

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We study the index n_+ of an $n \times n$ matrix belonging to the Gaussian unitary ensemble, which is the number of its positive eigenvalues. Based on a matrix model with a jump at the origin, we rigorously derive the asymptotics of the index distribution as the matrix size n becomes large, with $n_+ = cn$ and $0 \leq c \leq 1$. We also show that our model is closely related to a conditional Gaussian unitary ensemble, under the condition that each eigenvalue is independently observed with a given probability and no negative eigenvalues is observed.

Some problems of fluids free boundary problems

TAO LUO (罗涛)

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In this talk, I will discuss some recent progress and problems of fluids free boundary problems.

Global boundedness and asymptotic behavior in a three-dimensional chemotaxis-haptotaxis model

CHUNLAI MU (穆春来)

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In this talk, we deal with the chemotaxis-haptotaxis model of cancer invasion in a bounded smooth domain $\Omega \subset \mathbb{R}^3$ with no-flux boundary conditions, it is shown that the corresponding initial-boundary problem possesses a unique global-in-time classical solution that is bounded under some suitable assumptions on the initial data and the parameters. Furthermore, under small assumption on w_0 , we prove that the solution of system approach exponentially stabilizes to the constant stationary solution.

Existence and local uniqueness of bubbling solutions for poly-harmonic equations with critical growth

SHUANGJIE PENG (彭双阶)

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We studied a type of poly-harmonic equations with critical exponents and scalar curvature $K(y)$, $K(y)$ is positive and periodic in its first k variables (y_1, \dots, y_k) . Under some conditions on $K(y)$ near its critical point, we prove not only that this problem admits solutions with infinitely many bubbles, but also that the bubbling solutions obtained in our existence result are locally unique. This local uniqueness result implies that some bubbling solutions preserve the symmetry of $K(y)$.

Regular Shock Reflection Diffraction Problem by Wedges

WEI XIANG (向伟)

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It is a long history of the study of the regular shock reflection diffraction problem by wedges. In this talk, we will introduce the history and the recent progress. Finally, we will report our ongoing project and possible interesting problems.

Statistical Analysis of Large-scale Text Data

JUNHUI WANG (王军辉)

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In this talk, I will share some personal experience of utilizing statistical modelling and analysis technique to help in improving accuracy of analyzing large-scale text data. Three examples will be discussed in details, including sentiment analysis, learning to rank, recommender system, among others. Text data often come in the form of texts and can be vectorized into numeric vectors, yet rich structure information is often neglected in this process and the analysis afterwards. We will illustrate that these structure information can substantially benefit the text data analysis when they are appropriately incorporated in the statistical models. Also the size of text data is large-scale due to the rapid advance of information technology, and thus the computational challenges will be discussed as well.

Some Problems on Boundary Layers and High Reynolds number limits

TONG YANG (杨彤)

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In this talks, some problems on boundary layers and high Reynolds number limits for classical fluid, magnetohydrodynamic models and hybrid models will be discussed.

非齐次高维标量守恒律方程的光滑解全局存在的充分必要条件及相关问题

XIAOZHOU YANG (杨小舟)

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在本报告中，我们将报告非齐次高维标量守恒律方程的光滑解全局存在的充分必要条件，将给出我们发现的充分必要条件的定理，并与齐次高维标量守恒律方程的光滑解全局存在的充分必要条件进行比较。

我们还将报告中给出非齐次高维标量守恒律方程的高维激波和高维稀疏波表达式及其推导思路。此外我们还将报告一些高维激波的新结构和新现象。

Multiscale Data Analysis: Framelets, Manifolds and Graphs

XIAOSHENG ZHUANG (庄晓生)

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While Big Data are high-volume, high-dimensional, and high complexity, they are typically concentrated on low-dimensional manifolds or can be represented by graphs, digraphs, etc. Sparsity is the key to the successful analysis of data in various forms. Multiscale representation systems provide efficient and sparse representation of various data sets. In this talk, we will discuss the characterizations, construction, and applications of framelets on manifolds and graphs. We shall demonstrate that tight framelets can be constructed on compact Riemannian manifolds or graphs, and fast algorithmic realizations exist for framelet transforms on manifolds and graphs. Explicit construction of tight framelets on the sphere as well as numerical examples will be shown.