香港城市大学邱蔚峰等四位老师来我院作报告

2018 年 7 月 8 日 10:00-13:30（京时），香港城市大学邱蔚峰、代丹、莊晓生、王军辉等四位老师在数学与系统科学学院 308 会议室做了四场精彩的学术报告。此次学术由数学与系统科学学院的冯新龙教授主持。

学术报告一

报告人简介：王军辉，香港城市大学教授。本科毕业于北京大学，研究生毕业于美国明尼苏达大学并获得统计学博士学位。在加入香港城市大学之前，王军辉教授曾于美国哥伦比亚大学和伊利诺伊大学芝加哥分校担任教职。他的研究方向包括统计机器学习，非结构化数据分析，大数据分析，高维数据分析，模型选择，以及在生物医学，金融，和信息技术上的应用。他曾在 Journal of American Statistical Association, Biometrika, 和 Journal of Machine Learning Research 等统计及机器学习的顶级刊物上发表论文数十篇，并担任 Annals of the Institute of Statistical Mathematics 和 Statistics and its interface 副主编。

报告摘要：In recent years, there has been a growing demand for efficient recommender systems which track users' preferences and recommend potential items of interest to users. In this talk, I will give a brief review about recommender systems, including its problem setup, challenges, existing approaches, as well as some of the recent development.

学术报告二

报告人简介：代丹，香港城市大学副教授，于 2002 从复旦大学获得学士学位，2006 在复旦大学获得博士学位。在 2008 加入城市大学之前，他曾在比利时勒文大学 Kasoelek 大学担任博士后研究员。主要研究方向包括渐近分析、特殊函数、正交多项式和 Riemann –Hilbert 问题。

报告题目：Tracy-Widom distributions in critical unitary random matrix ensembles and the coupled Painleve II system

报告摘要：We study Fredholm determinants of the Painleve II and Painleve XXXIV kernels. In certain critical unitary random matrix ensembles, these determinants describe special gap probabilities of eigenvalues. We obtain Tracy-Widom formulas for the Fredholm determinants, which are explicitly given in terms of integrals

involving a family of distinguished solutions to the coupled Painleve II system in dimension four. Moreover, the large gap asymptotics for these Fredholm determinants are derived, where the constant terms are given explicitly in terms of the Riemann zeta-function.
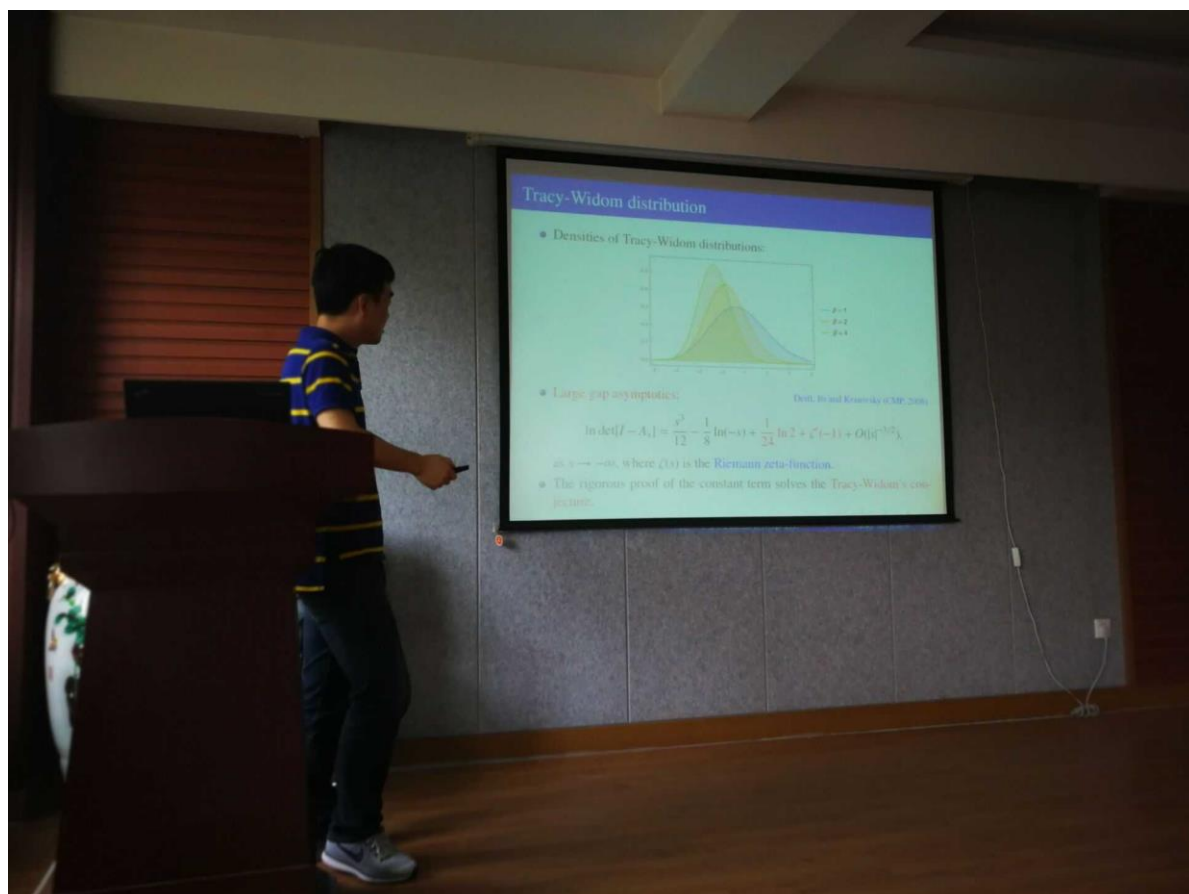
学术报告三

报告人简介：莊晓生，香港城市大学副教授，分别于 2003 和 2005 分别获得了中国 Sun Yat Sen（中山）大学的学士学位和数学硕士学位。于 2010 在加拿大艾伯塔大学获得应用数学博士学位。于 2011 年在奥斯纳布吕克大学担任博士后研究员，并于 2012 年担任柏林工业大学博士后研究员。他的研究兴趣包括定向多尺度表示系统、图像/信号处理和压缩感知。

报告题目：Affine Shear Tight Frames with 2-Layer Structure and

Their Applications in Image/Video Processing

报告摘要：In this talk, we present the characterizations, construction, and applications of affine shear tight frames with 2-layer structure. First, we introduce affine shear systems with 2-layer structure that have generators splitting the frequency region at each scale into inner and outer layers. Second, we provide the characterizations of affine shear systems with 2-layer structure to be affine shear tight frames with 2-layer structure. Finally, we show that digital affine shear transforms with 2-layer structure can be implemented with low redundancy rate and with near-linear computational complexity. Numerical experiments are conducted to demonstrate the advantages of our transforms in image/video processing such as denoising and inpainting.

学术报告四

报告人简介：邱蔚峰，香港城市大学副教授，于 2000 年获得上海师范大学学士学位，2006 年获得阿拉巴马大学亨茨维尔分校硕士学位，2010 年获得德克萨斯大学奥斯汀分校博士学位。他的博士生导师是 Leszek Demkowicz 教授。 在 2012 年加入城市大学之前，他曾在明尼苏达大学 IMA（数学及其应用研究所）担任博士后研究员。 他的博士后导师是 Bernardo Cockburn 教授。 他的主要研究兴趣包括 PDE 的科学计算和数值分析。于 2000 从上海师范大学获得学士学位，2006 在亨茨维尔阿拉巴马大学获得硕士学位，2010 在得克萨斯大学奥斯汀分校获得博士学位。曾在明尼苏达大学 IMA（数学与应用研究所）担任博士后研究员。主要研究方向为 PDE 的科学计算和数值分析。

报告题目：

Parameter-free superconvergent H(div)-conforming HDG methods

报告摘要：

We present new parameter-free superconvergent H(div)-conforming hybridizable discontinuous Galerkin (HDG) methods for the Brinkman equations on both simplicial and rectangular meshes. The methods are based on a velocity gradient - velocity - pressure formulation, which can be considered a natural extension of the H(div)-conforming HDG method (defined on simplicial meshes) for the Stokes flow (Cockburn, B. & Sayas, F.-J. (2014) Divergence-conforming HDG methods for Stokes flow. Math. Comp., 83, 1571-1598). We obtain an optimal L2-error estimate for the velocity in both the Stokes-dominated regime (high viscosity/permeability ratio) and Darcy-dominated regime (low viscosity/permeability ratio). We also obtain a superconvergent L2-estimate of one order higher for a suitable projection of the velocity error in the Stokes-dominated regime. Moreover, thanks to H(div)-

conformity of the velocity, our velocity error estimates are independent of the pressure regularity. Furthermore, we provide a discrete H1-stability result for the velocity field, which is essential in the error analysis of the natural generalization of these new HDG methods to the incompressible Navier–Stokes equations. Preliminary numerical results on both triangular and rectangular meshes in two dimensions confirm our theoretical predictions.