《2020年人民大学夏季PDE小型网上研讨会》

会议通知

　　为交流近年来在偏微分方程及其应用领域所取得的最新研究成果，研讨相关的前沿课题，同时促进偏微分方程相关领域的专家之间的交流与合作，中国人民大学数学科学研究院将于2020年7月11日上午及12上午日举办《2020年人民大学夏季PDE小型网上研讨会》。会议将邀请多名专家进行专题报告。

　　我们诚邀您出席此次学术活动；此次研讨会将使用腾讯会议进行线上报告，无任何费用，我们热情期待您的参与支持！

会议组委会：

柯媛元

楼　元

Izumi Takagi

欧耀彬

向　田

杨云雁

活动时间、地点：

7.11 会议日程： 2020，7.11， 8:30--12:10，会议 ID：985 341 994

会议链接： https://meeting.tencent.com/s/a5mxHD72KL7L

7.12 会议日程： 2020，7.12， 8:30--12:10，会议 ID：716 754 966

点击链接入会：https://meeting.tencent.com/s/rBBgmauUruH4

会议主办单位： 中国人民大学数学科学研究院

"2020年人民大学夏季PDE小型网上研讨会"
日程安排

2020年7月11日，周六	
腾讯会议 ID： 985 341 994	
时间	会议内容
8:20-8:30	开幕式
	Chair:
8:30-9:20	陈 化（武汉大学）
9:20-10:10	曹道民（中科院/广州大学）
10:10-10:20	休息
	Chair:
10:20-11:10	王学锋（香港中文大学-深圳）
11:10-12:00	冯兆生（University of Texas-RGV）

2020年7月12日，周日	
腾讯会议 ID：716 754 966	
时间	会议内容
	Chair:
8:30-9:20	娄本东（上海师范大学）
9:20-10:10	吴雅萍（首都师范大学）
10:10-10:20	休息
	Chair:
10:20-11:10	梁兴（中国科学技术大学）
11:10-12:00	向昭银（电子科技大学）

《2020 年人民大学夏季 PDE 小型网上研讨会》
报告摘要

可压欧拉方程的定常涡环解

曹道民

中科院数学院/广州大学

报告摘要：报告人将报告近年来在不可压欧拉方程定常涡解方面的研究，特别地要介绍在二维时涡补丁解（vortex patch)和 三维时涡环解（vortex ring）存在性和唯一性方面的结果。报告人将讲述涡补丁解的存在唯一性与 Kirchhoff－Routh 函数临界点之间的联系，而 Kirchhoff － Routh 临界点又与方程所在区域的几何性质密切相关。 报告人主要介绍的结果是来源于和郭玉霞、彭双阶、严树森合作的论文及和王国栋、万捷、詹伟城合作的论文。

On the vanishing viscosity limit of a chemotaxis model

陈化

武汉大学

报告摘要： A vanishing viscosity problem for the Patlak-Keller-Segel model is mentioned in this talk. This is a parabolic-parabolic system in a nD bounded domain with a vanishing viscosity epsilon going to zero. We

show that if the initial value lies in W^{1,p} with p>max{2,n}, then there exists a unique solution (u_epsilon,v_epsilon) with its lifespan independent of epsilon. Furthermore, as, epsilon tends to zero, (u_epsilon,v_epsilon) converges to the solution (u,v) of the limiting system in a suitable sense.

Chaotic Vibration of 1D and 2D Wave Equation with van der Pol

Boundary Condition

Zhaosheng　Feng

University of Texas-RGV

报告摘要：In this talk, we consider the one-and two-dimensional wave equation on the unit interval [0, 1] with a van der Pol condition. This nonlinear boundary condition behaves like a van der Pol oscillator, causing the total energy to rise and fall within certain bounds regularly or irregularly. We formulate the problem in terms of an equivalent first order hyperbolic system and use the method of characteristics to derive a nonlinear reflection relation caused by the nonlinear boundary conditions. Qualitative and numerical techniques are developed to tackle the cubic nonlinearities and the chaotic regime is determined. Numerical simulations and visualizations of chaotic vibrations are illustrated by computer graphics.

Principal eigenvalues and generalized principal eigenvalues

梁兴

中国科学技术大学

报告摘要： In the research of operator theory and its applications in partial differential equations and dynamical systems, the principal eigenvalues are always an important topic. In this talk we will introduce some work about the principal eigenvalues and generalized principal eigenvalues of positive operators, differential operators and integral operators.

Propagation of mean curvature flows with unbounded boundary slopes

娄本东

上海师范大学

报告摘要： I will talk about the propagation of some mean curvature flows in a cylinder with certain boundary conditions, which can be used to describe the motion of the level set in Allen-Cahn equations as well as the behavior of a curvature flow just after the singularity. Roughly

speaking, any flow of this kind will converge to a traveling wave solution (also called a translating solution) as the time goes to infinity. The limiting profile, however, depends on the boundary conditions. In particular, if the boundary slopes are unbounded as it moves to infinity, the limiting profile will be a Grim Reaper with unbounded slopes on the boundary. (joint work with Xiaoliu Wang and Lixia Yuan).

Bulk-Surface Coupling: Derivation of Two Models

王学锋

香港中文大学，深圳

报告摘要： It is well-known that cell polarization and cell division are caused by protein reaction-diffusion in the cytoplasm and on the cell membrane, which are coupled due to protein cycling between them. To model these cellular phenomena, numerous bulk-surface models have been proposed, which, in the simplest form, consist of one diffusion equation for inactive protein the cytoplasm and another one for active protein on the thickest membrane, with a flux boundary condition coupling the proteins in the bulk and on the surface. A rigorous derivation of such models seems lacking, which motivates this work. We assume that the membrane has positive but small thickness \delta and that the

phospholipid molecules in the membrane are optimally aligned and we start with two full models each of which contains reaction-diffusion equations in the bulk and the membrane, respectively, with reasonable transmission conditions linking the two. Then in the limit of \delta tending to zero, we obtain two effective models, with one having the same form as the simplest bulk-surface model mentioned above, the other being a single diffusion equation in the cytoplasm with a dynamical boundary condition. Our models satisfy mass conservation property, which has been a yardstick for the existing bulk-surface models. Our investigation reveals that the optimal alignment of phospholipid molecules and the tangential diffusion in the cell membrane result in the surface diffusion in bulk-surface models, and that a single diffusion equation with a dynamical boundary condition may serve as a simpler alternative model for bulk-surface coupling. This is a joint work with Jingyu Li and Linlin Su.

Existence and instability of two types of blowing-up steady states for the SKT competition model with cross-diffusion

吴雅萍

首都师范大学

报告摘要：This talk is focused on the following simplified SKT two species competition model with cross-diffusion.

$u_t = \Delta[(d_1+\gamma_1 v)u]+u(a_1-b_1 u-c_1 v),$

$v_t = d_2 \Delta v+v(a_2-b_2 u-c_2 v)$

I shall talk about our recent work on the existence and blowing-up structure as well as the instability of two types of nontrivial positive steady states of two limiting systems of SKT model when γ_1 tends to infinity and d_2 is near a_2/λ_1 and the original SKT model when γ_1 is large enough. The talk is based on the joint work with Qing Li and Kousuke Kuto.

The convergence rate of the fast signal diffusion limit for a

Keller-Segel-Stokes system with large initial data

向昭银

电子科技大学

报告摘要： In this talk, we investigate the fast signal diffusion limit of solutions of the fully parabolic Keller-Segel-Stokes system to solution of

the parabolic-elliptic-fluid counterpart in a 2D or 3D bounded domain with smooth boundary. Under the natural volume-filling assumption, we establish an algebraic convergence rate of the fast signal diffusion limit for general large initial data by developing a series of subtle bootstrap arguments for combinational functionals and using some maximal regularities. In our current setting, in particular, we can remove the restriction to asserting convergence only along some subsequence in Wang-Winkler-Xiang (Cal. Var., 2019). This is a joint work with Dr Min Li.