非线性扩散方程
研讨会程序册

华南师范大学数学科学学院

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会议进程：2017 年 11 月 11 日大会学术报告，12 日自由讨论。

报告地点：华南师范大学数学科学学院二楼阶梯课室。

报告程序

2015 年 11 月 11 日（星期六）		
时间	报告人	主持人
08：30～08：50	开幕式	王春朋
08：50～09：00	合影	
09：00～09：30	王一夫	季善明
09：30～10：00	王春朋	
10：00～10：30	茶歇	
10：30～11：00	王良伟	叶海龙
11：00～11：30	李进开	
11：30～14：30	午餐	
14：30～15：00	曹杨	李进开
15：00～15：30	李静	
15：30～16：00	茶歇	
16：00～16：30	金春花	杨莹
16：30～17：00	聂元元	
17：00～17：20	闭幕式	雷沛东
17：45～20：00	晚宴	

摘要

伪抛物型方程的若干研究进展
曹杨
（大连理工大学）
本报告主要介绍伪抛物型方程的背景及近期的一些研究进展。

Global Classical Solution and Boundedness to a Chemotaxis- Haptotaxis Model with Re-establishment Mechanisms

金春花

（华南师范大学）

In this talk, we introduce a chemotaxis-haptotaxis model with re-establishment effect. We consider this problem in a bounded domain with zero-flux boundary conditions. Although the L^∞ -norm of the ECM density ω is easy to be obtained, the re-establishment mechanism still cause essential difficulty due to the deficiency of regularity for ω. We use some iterative techniques to establish the $W^{1,\infty}$ bound of uPA protease concentration v, and further obtained the L^∞ estimate of the cancer cell density u. Using these a prior estimates, we finally established the existence of global-in-time classical solution, which is bounded uniformly. In particular, the global solvability and boundedness of smooth solutions in dimension 3 has never been touched before, this is the first attempt to solve this problem.

Entropy-bounded solutions of the compressible Navier-Stokes equations in the presence of far field vacuum

李进开

（香港中文大学）

The entropy is one of the fundamental states of a fluid. In spite of its physical importance in the gas dynamics, the mathematical analysis on it in the presence of vacuum was rarely carried out. As the entropy is expressed as some combination of the logarithems of the temperature and the density, the entropy is not even well defined in the vacuum region, and the regularities of the temperature and density do not imply any desired uniform regularities of the entropy near the vacuum region from the non-vacuum side. It has been known that classical solutions to the full compressible Navier-Stokes equations may blow up in finite time, and may have no

solutions in the class of inhomogeneous Sobolev space, if the initial density has nontrivial compact support. Different from the compact supported case, in this talk, we will show that the one-dimensional full compressible Navier-Stokes equations are globally well-posed in the inhomogenesous Sobolev spaces, and the corresponding entropy can be uniformly bounded from both above and below, if the initial density has no interior vacuum, but decays to vacuum slowly at the far field.

Large time behavior of solutions to a fully parabolic attraction-repulsion chemotaxis system
李静
（中央民族大学）

The talk is a survey of the new results for a class of fully parabolic attraction-repulsion chemotaxis system with or without logistic source under homogeneous Neumann boundary conditions in a smooth bounded domain in R^N.

Perturbation Problems of Continuous Subsonic-Sonic Flowsin Convergent Nozzles
聂元元
（吉林大学）

In this talk, we will discuss the perturbation problems of isentropic, irrotational, steady compressible and continuous Euler subsonic-sonic flows in a 2-D convergent nozzle: finitely convergent nozzles, finitely and infinitely long symmetric convergent nozzle. The problems we consider can be described as the free boundary problem of nonlinear degenerate elliptic equations with nonlocal boundary value conditions and degeneracy at free boundary, whose free boundary is sonic curve. The main methods we use to solve the problem are the Schauder fixed point theorem and energy estimates.

在边界退化的拟线性椭圆和抛物方程
王春朋
（吉林大学）
介绍关于边界退化的拟线性椭圆和抛物方程的几类问题，包括边值的提法和适定性、解的最优正则性、近似和精确可控性、解的渐近行为。

Proper spaces for the asymptotic convergence of solutions of porous medium equation

王良伟

（重庆三峡学院）

In this talk, we consider the problem that a weighted L^∞ space $W_\vartheta(\mathbb{R}^N)$ is proper or not for the asymptotic convergence of solutions of the porous medium equation. We find that there exists a critical exponent $\vartheta=\sigma$ of the proper spaces for the asymptotic problem proposed by Alikakos and Rostamian in 1984.

Global boundedness of solutions to a chemotaxis—haptotaxis model with tissue remodeling

王一夫

（北京理工大学）

This talk is concerned with a cancer invasion model comprising a strongly coupled PDE-ODE system in two and three space dimensions. The system consists of a parabolic equation describing cancer cell migration arising from a combination of chemotaxis and haptotaxis, a parabolic/elliptic equation describing the dynamics of matrix degrading enzymes (MDE), and an ODE describing the evolution and re-modeling of the extracellular matrix (ECM). We point out that this strongly coupled PDE-ODE setup presents new mathematical difficulties, which are overcome by developing new integral estimate techniques.We prove that the system admits a unique global classical solution which is uniformly bounded in time in the two-dimensional spatial setting at all cancer cell proliferation rates. We also prove that, in the case of three-dimensional convex spatial domain, when cancer cell proliferation is suitably small, the system also possesses a unique classical solution for appropriately small initial data. These results improve previously known ones.