哈尔滨工业大学
HARBIN INSTITUTE OF TECHNOLOGY

"椭圆和抛物型偏微分方程"
专题研讨会

程 序 册

数学研究院&数学学院

2023.07.29–31

"椭圆和抛物型偏微分方程"
专题研讨会

会议地点：哈尔滨工业大学一校区明德楼 B 区 201-1 学术报告厅

参会专家：

曹　杨（大连理工大学）	丁梦瑶（北京大学）
郭　斌（吉林大学）	黄　锐（华南师范大学）
黄勇攀（西安工程大学）	贾惠莲（西安交通大学）
金春花（华南师范大学）	来米加（上海交通大学）
李风泉（大连理工大学）	李　静（中央民族大学）
李启凡（武汉理工大学）	李　彤（University of Iowa）
李　影（上海大学）	李仲庆（贵州财经大学）
梁四化（长春师范大学）	廖乃安（Universität Salzburg）
钮维生（安徽大学）	唐　岚（华中师范大学）
陶雪妍（中国海洋大学）	陶有山（上海交通大学）
滕凯民（太原理工大学）	王金环（辽宁大学）
王立河（University of Iowa）	王文栋（大连理工大学）
向　田（中国人民大学）	袁云飞（重庆理工大学）
张彬林（山东科技大学）	郑神州（北京交通大学）
周春琴（上海交通大学）	周蜀林（北京大学）

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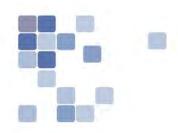

会议联系人：

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会 议 日 程

2023 年 7 月 29 日，周六上午

时 间	报告信息	主持人
08:50–09:00	欢迎致辞、合影	张 超
09:00–09:35	Partial regularity of Navier-Stokes equations 王立河 爱荷华大学	周蜀林
09:40–10:15	Partial and everywhere regularity for variational integrals and elliptic systems 郑神州 北京交通大学	李风泉
10:20–10:35	休 息	
10:35–11:10	Anisotropic Moser-Trudinger inequality and it's related inequalities 周春琴 上海交通大学	唐 岚
11:15–11:50	退化抛物型方程和内蕴尺度 廖乃安 萨尔茨堡大学	钮维生

2023 年 7 月 29 日，周六下午

时　间	报告信息	主持人
14:30–15:05	Global well-posedness to a cancer invasion model with nonlinear diffusion 金春花　华南师范大学	黄　锐
15:10–15:45	A note on Liouville equation on complete surfaces with nonnegative Gauss curvature 来米加　上海交通大学	滕凯民
15:50–16:05	休　息	
16:05–16:40	On a critical and singular Kirchhoff-type elliptic equation 张彬林　山东科技大学	王金环
16:45–17:20	Wavefronts and asymptotic behavior for Keller-Segel type chemotaxis-growth models 李静　中央民族大学	曹　杨
17:25–18:10	Logarithmic upper bounds for solutions to nonuniform elliptic or parabolic equations 郭斌　吉林大学	梁四化

2023 年 7 月 30 日，周日上午

时　　间	报告信息	主持人
09:00–09:35	Critical blow-up exponents in a chemotaxis system with indirect signal production modeling phenotypical heterogeneity 陶有山　上海交通大学	李　彤
09:40–10:15	Interior Dini regularity for p-Laplacian type equations 贾惠莲　西安交通大学	黄勇攀
10:20–10:35	休息	
10:35–11:10	Well-posedness results on a haptotactic cross-diffusion system modeling oncolytic virotherapy 陶雪妍　中国海洋大学	向　田
11:15–11:50	Partial regularity for degenerate parabolic systems with nonstandard growth and discontinuous coefficients 李启凡　武汉理工大学	丁梦瑶

2023 年 7 月 30 日，周日下午
自由讨论

报告题目与摘要

7 月 29 日上午

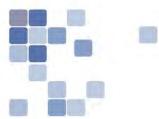## Partial regularity of Navier-Stokes equations

王立河

爱荷华大学

Abstract： We prove the partial regularity theorem based on a new compactness lemma and the monotonicity formula.

Partial and everywhere regularity for variational integrals and elliptic systems

郑神州

北京交通大学

Abstract： In this talk, we introduce the necessity of partial regularity for variational integrals and nonlinear elliptic systems. By recalling the Morrey and Campanato decay estimates, we discuss some useful approaches to study partial regularity of the solutions. Meanwhile, we try to find an extension of everywhere regularity result to variational integrals and systems in the vectorial case.

Anisotropic Moser-Trudinger inequality and it's related inequalities

周春琴

上海交通大学

Abstract：In this talk, I mainly introduce some ideas that be used to extend the classical Moser-Trudinger inequality to its anisotropic type. Similar arguments can be applied for establishing the anisotropic weighted Moser-Trudinger inequality and the anisotropic Adams' inequality. These are joint works with Changliang Zhou, Tao Zhang and Tingzhi Cheng.

退化抛物型方程和内蕴尺度

廖乃安

萨尔茨堡大学

摘要：受 Hilbert 第 19 问题启发，De Giorgi 在 50 年代研究了具有可测系数的线性椭圆方程，并建立了其广义解的 Hölder 连续性。他开创的方法打开了研究高维非线性问题的大门。其后，出现了 Moser 的新方法，又出现了 Aronson-Serrin, Ladyzhenskaya-Ural'tzeva, Trudinger 等人的新发展。但是，他们的方法不足以研究有退化行为的抛物型方程。这个问题到 80 年代取得重要进展--内蕴尺度的概念被提出。彼时，推动此概念的主要有陈亚浙, DiBenedetto, Friedman, Vespri, Wiegner 等人，他们的贡献收录于 DiBenedetto 的专著（1993）。现今，它已是研究具有内蕴退化行为的偏微分方程的基石。本报告将简要阐述内蕴尺度，并介绍近期它在几类退化抛物方程的应用。
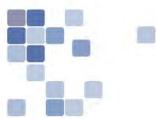
7 月 29 日下午

Global well-posedness to a cancer invasion model with nonlinear diffusion

金春花

华南师范大学

Abstract ： In this talk, we consider a cancer invasion model with nonlinear diffusion and remodeling of ECM. The primary difficulty that arises here is that due to nonlinear diffusion, the good coupling structure between the diffusion term and haptotactic term is destroyed, rendering the effective methods used in the linear diffusion model no longer applicable. Fortunately, we have found a new effective combination between the diffusion term and the haptotactic term, which allows the diffusion term to dominate the haptotactic term, thus preliminarily improving the regularity of the weak solution. Based on these results, we can prove part of long-time asymptotic behavior of the solution, thereby finally proving the uniform boundedness of the weak solution. Subsequently, by improving the convergence of cancer cells, it is also proved that after a long time, the weak solution will eventually be Hölder continuous for some slow diffusion cases.

A note on Liouville equation on complete surfaces with nonnegative Gauss curvature

来米加

上海交通大学

Abstract：In a seminal work of Chen-Li, they classify finite total curvature solution to the Liouville equation on the plane. In this talk, we generalize Chen-Li's result to complete surfaces with nonnegative Gauss curvature.

On a critical and singular Kirchhoff-type elliptic equation

张彬林

山东科技大学

Abstract ： In this talk, we discuss a three-dimensional Kirchhoff-type elliptic equation involving critical and singular nonlinearities. By combining variational methods with some delicate decomposition techniques, we obtain the existence of two positive solutions in the case of low perturbations of the singular nonlinearity, namely for small values of the parameter. Here we point out that our decomposition techniques could be applied to more elliptic equations with critical growth. This is a joint work with Chunyu Lei and Vicentiu D. Radulescu.
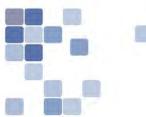
Wavefronts and asymptotic behavior for Keller-Segel type chemotaxis-growth models

李　静

中央民族大学

Abstract：In this talk, we present our recent results on the wavefronts and the asymptotic behavior of classical solutions for Cauchy problem of Keller-Segel type chemotaxis-growth models. For the classical parabolic-parabolic ($\tau>0$) Keller-Segel system with logistic source, by loop argument and an iterative process, we establish the asymptotic stability of the positive constant equilibria for any initial data with positive lower bound. For the special case $\tau=1$, by constructing localized-in-space Lyapunov type functional, the hair-trigger effect is detected. After that, we turn to the Keller-Segel type chemotaxis-growth model with density-suppressed motility, explore how the density-suppressed motility influences travelling wave profiles, the "minimal wave speed" and the asymptotic spreading speed for initial data with non-empty compact support. This is joint work with Jingxue Yin, Zhian Wang and Dejixiangmao.

Logarithmic upper bounds for solutions to nonuniform elliptic or parabolic equations

郭　斌

吉林大学

Abstract：The aim of this talk is to give the relationship between local boundedness of the weak solution of nonuniformly elliptic or parabolic equations and the regularity of the coefficient matrix and the nonhomogeneous term. In particular, some sharp conditions for the nonhomogeneous term are also obtained.
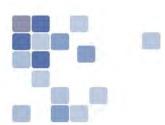
7 月 30 日上午

Critical blow-up exponents in a chemotaxis system with indirect signal production modeling phenotypical heterogeneity

陶有山

上海交通大学

Abstract：This talk addresses an initial-boundary problem for a quasilinear chemotaxis system with indirect attractant production, as arising in the modeling of effects due to phenotypical heterogeneity in microbial populations. Under the assumption that the rates D and S of diffusion and cross-diffusion are suitably regular functions of the population density, essentially exhibiting asymptotically algebraic behavior at large densities. A critical line in low-dimensional cases and two critical lines in higher-dimensional cases concerning the exponents of D and S for the occurrence of blow-up were found. This is a recent joint work with Prof. Michael Winkler (Paderborn).

Interior Dini regularity for p-Laplacian type equations

贾惠莲

西安交通大学

Abstract：In this talk, we study the interior Dini type regularity for p-Laplacian type equations via Campanoto space method, with the assumptions that the righthand-side term F and the coefficient matrix A satisfy suitable Dini mean oscillation conditions.

Well-posedness results on a haptotactic cross-diffusion system modeling oncolytic virotherapy

陶雪妍

中国海洋大学

Abstract：One of the most promising strategies to treat cancer is attacking it with viruses. This talk begins with an introduction to a haptotactic cross-diffusion system modeling oncolytic virotherapy. After reviewing some existing results on this model, we shall report some results on global boundedness and asymptotic behavior of classical solutions to this system in two-dimensional domains.

Partial regularity for degenerate parabolic systems with nonstandard growth and discontinuous coefficients

李启凡

武汉理工大学

Abstract：In this talk, we present some recent developments regarding the partial regularity theory of elliptic and parabolic systems. We also discuss the proof of the partial regularity results for the parabolic systems with variable exponent growth and VMO coefficients. Last part of the talk will give open questions regarding to this topic.

规格严格

功夫到家