非线性分析的理论和应用学术研讨会

会 议 手 册

福建师范大学数学与统计学院

福建省分析数学及应用重点实验室

福建省应用数学中心（福建师范大学）

2023 年 3 月 24 日—3 月 27 日

非线性分析的理论和应用学术研讨会

为进一步提高我校非线性泛函分析及其应用研究领域的师生的研究水平，增进与国内外同行的交流，探讨本研究领域的最新研究成果，定于2023年3月24日至27日，在福建师范大学举办“非线性分析的理论和应用学术研讨会”，诚邀您莅临指导。

主办单位: 福建师范大学数学与统计学院
福建省分析数学及应用重点实验室
福建省应用数学中心（福建师范大学）

会议报到地点: 福州市梅园酒店（上街）

会议时间安排: 2023 年 3 月 24 日报到; 3 月 25 日学术报告; 3 月 26 日上午学术报告; 3 月 26 日下午自由讨论; 3 月 27 日返程

会议举办地点:福州市梅园酒店（上街）

会议费用: 本次会议不收费

会议组织者: 陈建清，李永青，王志强，曾晶，钟延生

会议联系人: 陈建清 13685010684

Schedule

March 25th

主持人	时间	报告人	题目
王志强	8:25	会议开幕式	
王志强	8:30-9:10	丁彦恒	变分法和无穷维Hamilton系统
	9:10-9:50	段华贵	Lower bound on the number of periodic orbits
茶歇			
杨敏波	10:10-10:50	苏加宝	The Quasilinear Schrodinger–Poisson System
田如顺	10:50-11:30	张彬林	Critical and singular Kirchhoff-type problems
午餐			
周焕松	14:00-14:40	蒋美跃	A Variational Problem Arising From the Planar Discrete L_p-Minkowski Probelm
陈少伟	14:40-15:20	王俊	Some new results for the existence and multiplicity of self-similar solutions for the parabolic equations
茶歇			
李永青	15:40-16:20	Li Songying (UC, Irvine)	Regularity for the solutions of the Cauchy-Riemann operators and the solution of the Kerzman's problem on Sup-norm estimates

黄代文	16:20-17:00	吴元泽	Infinitely many nonradial positive solutions for multi-species nonlinear Schrodinger systems in R^N
晚餐			

Schedule

March 26th

主持人	时间	报告人	题目
周风	8:30-9:10	张志涛	Dynamics of nonlinear hyperbolic equations of Kirchhoff type
	9:10-9:50	唐仲伟	Compactness and existence results of the prescribing fractional Q-curvature problem
茶歇			
赵雷嘎	10:10-10:50	郭千桥	Blowup Analysis for Some Nonlinear Differential/Integral Equations with Negative Exponents
陈建清	10:50-11:30	姬超	Some results on normalized solutions for the Schrödinger equations
午餐			

报告摘要

Lower bound on the number of periodic orbits

段华贵,南开大学

In Hamiltonian system, a longstanding conjecture claims that there exist at least n closed characteristics on compact star-shaped hypersurfaces in R^{2n}. In this talk I will introduce some recent progress about this conjecture under some additional conditions, including the index restriction and the non-degenerate condition.

变分法和无穷维Hamilton系统

丁彦恒,中科院数学院

简介变分方法与无穷维Hamilton 系统, 选取现代非线性分析中的几类问题为例解释其应用. 特别地, 利用变分理论, 建立统一的变分框架，讨论量子理论中的非线性Dirac方程等几类系统的基态解的存在性、半经典极限和非相对论极限等问题.

Blowup Analysis for Some Nonlinear Differential/Integral Equations with Negative Exponents

郭千桥,西北工业大学数学与统计学院

We study the blowup behavior of the minimizing sequence near the blowup points to some nonlinear differential/integral equations involving negative critical exponents, which is different from that of nonlinear differential equations involving positive critical exponents.

Some results on normalized solutions for the Schrödinger equations

姬超,华东理工大学

In this talk, we will introduce some recent results on normalized solutions for the Schrödinger equations. On one hand, we show existence of normalized solutions for the Schrödinger equations with L^2-subcritical growth and different types of potentials. On the other hand, existence and multiplicity of normalized solutions for a Schrödinger equation with critical growth in $\mathbb{R}^N$ will be given. These are joint works with C.O. Alves and O. H. Miyagaki from Brazil.

A Variational Problem Arising From the Planar Discrete L_p-Minkowski Probelm

蒋美跃, 北京大学

In this talk we will discuss the planar discrete L_p-Minkowski probelm for $p < 0$ via variational method: given N unit vectors $u_1, \cdots, u_N$ in $\mathbb{R}^2$ not located on a closed semi-circle, and positive numbers $a_1, \cdots, a_N$, find a convex N-polygon P such that i-th side normal is u_i and the corresponding L_p-surface measure is a_i. This is equivalent to solve the following nonlinear equation:

$$(-Ah)_i = \frac{h_{i+1}-h_i}{\sin(\theta_{i+1}-\theta_i)} - \frac{h_i-h_{i-1}}{\sin(\theta_i-\theta_{i-1})} + \left[\frac{1-\cos(\theta_{i+1}-\theta_i)}{\sin(\theta_{i+1}-\theta_i)} + \frac{1-\cos(\theta_i-\theta_{i-1})}{\sin(\theta_i-\theta_{i-1})}\right]h_i = a_i h_i^{p-1}, h_i > 0,$$

where $h = (h_1, \cdots, h_N)^t$, $u_i = (\cos\theta_i, \sin\theta_i)$ and $\theta_{N+1} = \theta_1, h_{N+1} = h_1$.

Regularity for the solutions of the Cauchy-Riemann operators and the solution of the Kerzman's problem on Sup-norm estimates

Song-Ying Li,University of California, Irvine

In this talk, I will present the recent develepments of the solutions of Cauchy-Riemann equations of several complex variables. For the existence, I will introduce the well known theorem of Hörmander on the weighted L^2 estimates. For regularity, I will present two methods to study the solution of the CR-equations. In particular, I will present our results (jointly with X. Dong and N. Treuer) on the regularity of the solution of CR equations on bounded symmetric domains. Finally, I will introduce my recent work on solving a long term open problem posed Kerzman in 1971 on sup-norm estimate for CR-equations on product domains in $\mathbf{C}^n$.

The Quasilinear Schrödinger–Poisson System

苏加宝,首都师范大学

This talk is concerned with the (p,q)–Schrödinger–Poisson system

$$\begin{cases} -\Delta_p u + |u|^{p-2}u + \lambda\varphi|u|^{s-2}u = |u|^{r-2}u, \text{ in } \mathbb{R}^3, \\ -\Delta_q \varphi = |u|^s, \quad \text{in } \mathbb{R}^3, \end{cases}$$

where $\Delta u = \operatorname{div}(|\nabla u|^{i-2})\nabla u$ $(i = p, q)$ and $\lambda > 0$ is a parameter. This quasilinear system is new and has never been considered in the literature.The uniqueness of solutions of the quasilinear Poisson equation is obtained via the Minty-Browder theorem. The variational framework of the quasilinear system is established and the nontrivial solutions of the system are obtained via the mountain pass theorem.

It is a joint work with Dr. Yao Du(杜瑶) and Dr.Cong Wang(王聪):arXiv:2205.03237.

Compactness and existence results of the prescribing fractional Q-curvature problem

唐仲伟,北京师范大学

In this talk, I will present some results of the prescribing fractional Q-curvature problem, we are devoted to establishing the compactness and existence results of the solutions to the prescribing fractional Q-curvature problem of order 2σ on n-dimensional standard sphere when $n-2\sigma=2$, $\sigma=1+m/2$, $m\in\mathbb{N}_+$. The compactness results are novel and optimal. In addition, we prove a degree-counting formula of all solutions to achieve the existence. From our results, we can know where blow up occur. Furthermore, the sequence of solutions that blow up precisely at any finite distinct location can be constructed. It is worth noting that our results include the case of multiple harmonic. This is a joint work with Dr. Yan Li and Ning Zhou.

Some new results for the existence and multiplicity of self-similar solutions for the parabolic equations

王俊,江苏大学

In this talk, we first introduce some new results for the existence self-similar solutions to the Hénon type parabolic equation with positive singular initial value. On the other hand, we give the existence of multiple positive solutions of the parabolic Lane-Emden system with singular initial data.

Infinitely many nonradial positive solutions for multi-species nonlinear Schrodinger systems in $\mathbb{R}^N$

吴元泽, 中国矿业大学

In this talk, I will report our recent results, based on the joint work of Doctor Tuoxing Li and Professor Jucheng Wei, on the multi-species nonlinear Schrodinger systems in $\mathbb{R}^N$ By Ljapunov-Schmidt reduction arguments, we construct infinitely many nonradial positive solutions of the above system under some mild assumptions on potentials and coupling parameters, without any symmetric assumptions on the limit case of the above system. Our result, giving a positive answer to the conjecture of Pistoia and Vaira in [Pistoia-Vaira, Comm. PDEs, 2022] and extending the results in [Peng-Wang, ARMA, 2013] and [Pistoia-Vaira ,Comm. PDEs, 2022], reveals new phenomenon for the two-species in dimension two and is almost optimal for the coupling parameters.

Critical and singular Kirchhoff-type problems

张彬林,ft东科技大学

In this talk, we discuss a three-dimensional Kirchhoff-type problem 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 exponents. This is a joint work with C. Lei and V. Radulescu.

Dynamics of nonlinear hyperbolic equations of Kirchhoff type

张志涛, 中国科学院数学与系统科学研究院 江苏大学

We study the initial boundary value problem of the important hyperbolic Kirchhoff equation

$$u_{tt} - \left(a \int_{\Omega} |\nabla u|^2 dx + b \right) \Delta u = \lambda u + |u|^{p-1}u, \quad u(t,x)|_{\partial\Omega} = 0,$$

where $a, b > 0$, $p > 1$, Γ and the initial energy is arbitrarily large. We prove several new theorems on the dynamics such as the boundedness or finite time blow-up of solution under the different range of a, b, Γ and the initial data.

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