

调和分析及其应用研讨会

会议手册



哈尔滨工业大学 数学研究院
2024年1月12日-1月13日上午

调和分析及其应用研讨会

欢迎您莅临参加“调和分析及其应用研讨会”。此次会议在哈尔滨工业大学数学研究院举行，旨在探讨调和分析及相关领域的最新研究成果和前沿进展，并促进该领域的学术交流与合作。

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

会议住宿：哈尔滨索菲特酒店

报告时间：2024 年 1 月 12 日-13 日上午

离会时间：2024 年 1 月 13 日下午

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主办单位：哈尔滨工业大学数学研究院

报告日程

1月12日		
时间	报告	主持人
9:00-9:10	开幕式致辞 + 合影	
9:10-9:55	报告人: 孙文昌 题目: Nonuniform Sobolev Spaces	李洪全
9:55-10:15	休息	
10:15-11:00	报告人: 李俊峰 题目: The space-time estimates for the Schrödinger equation	薛庆营
11:05-11:50	报告人: 李康伟 题目: Bilinear analysis with Zygmund dilations	耿俊
11:50-14:45	午休	
14:45-15:30	报告人: 陈艳萍 题目: Weighted bounds for super singular integral operators with rough kernels	袁文
15:30-15:50	休息	
15:50-16:35	报告人: 席亚昆 题目: Weyl law, Kuznecov sum, and inverse spectral problems	伍火熊
16:40-17:25	报告人: 诸葛金平 题目: Nodal sets of Dirichlet eigenfunctions in quasiconvex Lipschitz domains	洪桂祥

1月13日		
时间	报告	主持人
9:00-9:45	报告人: 伍火熊 题目: Rough oscillatory singular integrals and Carleson type maximal operators	席亚昆
9:45-10:05	休息	
10:05-10:50	报告人: 傅尊伟 题目: Riesz 变换 vs Riesz 位势--分数阶傅里叶变换视域下	李康伟
10:55-11:40	报告人: 陈冬香 题目: Global unique solvability for the 3D inhomogeneous incompressible asymmetric equations with bounded density in critical Sobolev space	赖旭东

报告题目与摘要

Global unique solvability for the 3D inhomogeneous incompressible asymmetric equations with bounded density in critical Sobolev space

陈冬香

江西师范大学

摘要：In this paper, we establish the global existence of weak solutions to the 3-D inhomogeneous incompressible asymmetric system provided that the initial density $0 < \rho_0 \in L^\infty$, the initial velocity u_0 and the initial angular velocity w_0 are small in the critical Sobolev space $H^{\frac{1}{2}}(R^3)$. Furthermore, if an additional condition is imposed on the initial data, that is,

$$\|(u_0, w_0)\|_{\dot{B}_{2,1}^{\frac{1}{2}}} + \|w_0\|_{\dot{B}_{2,1}^{-\frac{1}{2}}} < \infty,$$

and the initial density has positive lower bound (i.e. $\rho_0 \geq \alpha > 0$), the uniqueness is established. In addition, we also obtain the decay of this global strong solution with respect to time variable t .

Weighted bounds for super singular integral operators with rough kernels

陈艳萍

北京科技大学

摘要：We study the rough homogeneous super singular integrals. In the paper, we firstly establish a bilinear form dominated by sparse forms. Based on this, we also provide a quantification of the weighted inequalities due to Watson and Duoandikoetxea.

Riesz 变换 v.s. Riesz 位势--分数阶傅里叶变换视域下

傅尊伟

临沂大学

摘要：本报告在分数阶傅里叶视域下展示了 Riesz 变换和 Riesz 位势的差异，包括数学性质原理及其在图像边缘检测、数据加密处理中的应用。构思分数阶乘子定理在数据隐私计算中的应用场景。该工作分别与杨大春教授, Loukas Grafakos 教授, 林燕教授, 吴越副教授, 杨淑辉博士合作完成。

The space-time estimates for the Schrödinger equation

李俊峰

大连理工大学

摘要： In this talk, I will present our recent work on the space-time estimate for the Schrödinger equation. By using wave packet decompositions, polynomial partitioning method and a refined Strichartz estimate, we obtain a high frequency input maximal estimate for the 2D Shrourding group. By this estimate we confirmed a conjecture formulated by Planchon. For high dimensional case, we set up a high frequency input bilinear estimate, and improved the known result in high dimensional case. This talk is based on the joint work with Changxing Miao and Ankang Yu.

Bilinear analysis with Zygmund dilations

李康伟

天津大学

摘要： In this talk, I will introduce our recent progress on singular integral theory associated with Zygmund dilations. In particular, using the natural bilinear Fefferman-Pipher multiplier as model, we systematically formulated the bilinear kernel estimates in the Zygmund setting. Then along with natural T1 type assumptions we get the boundedness of bilinear Zygmund type singular integrals.

Nonuniform Sobolev Spaces

孙文昌

南开大学

摘要： We study nonuniform Sobolev spaces, i.e., spaces of functions whose partial derivatives lie in possibly different Lebesgue spaces. Although standard proofs do not apply, we show that nonuniform Sobolev spaces share similar properties as the classical ones. These spaces arise naturally in the study of certain PDEs. For instance, we illustrate that nonuniform fractional Sobolev spaces are useful in the study of convergence of Schrödinger operators. In this work we extend recent advances on the convergence of Schrödinger operators to nonuniform fractional Sobolev spaces.

Rough oscillatory singular integrals and Carleson type maximal operators

伍火熊

厦门大学

摘要: This talk is concerning with the estimates of rough oscillatory singular integrals and the Carleson type maximal operators with real polynomial phases, or certain general rational function phases on higher dimensional cases. We will present the classical results and the recent results with mild regularity or rough kernels.

Weyl law, Kuznecov sum, and inverse spectral problems

席亚昆

浙江大学

摘要: The study of (pointwise) Weyl asymptotics is one of the central problems in spectral geometry and harmonic analysis on Riemannian manifolds. The Kuznecov formula is a generalized version of the pointwise Weyl formula. We survey our recent works on pointwise Weyl law, (generalized) Kuznecov sum formula, and related inverse problems.

Nodal sets of Dirichlet eigenfunctions in quasiconvex Lipschitz domains

诸葛金平

中国科学院

摘要: Estimating the size of the nodal sets for the eigenfunctions of elliptic operators is a classical unique continuation problem, which has had several breakthroughs recently due to A. Logunov's work. In this talk, I will give a brief introduction to this problem and present our recent work on the estimate of nodal sets in quasiconvex Lipschitz domains.

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(按姓名拼音排序)

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