上海交通大學 SHANGHAI JIAO TONG UNIVERSITY | 数学科学学院 SCHOOL OF MATHEMATICAL SCIENCES

Workshop on Nonlinear Partial Differential Equations XXIV

April 25-27, 2025

Program

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1. Workshop Information

Announcement:

In order to enhance the communications among the mathematicians on the subject of partial differential equations, geometric analysis and related topics, we plan to hold "Workshop on nonlinear partial differential equations XXIV" on April 25-27, 2025. We will invite some experts to share ideas and results on recent research, and discuss current challenging issues.

Organizing Committee:

Congming Li, Shanghai Jiao Tong University (Chair)
Yahong Guo, Shanghai Jiao Tong University
Yingshu Lv, Shanghai Normal University
Weike Wang, Shanghai Jiao Tong University
Hui Yang, Shanghai Jiao Tong University
Chunqin Zhou, Shanghai Jiao Tong University
Ran Zhuo, Shanghai Normal University

Venues:

Room 208, No. 6 Science Building
Minhang Campus
Shanghai Jiao Tong University, 800 Dongchuan Road

Contact Us

Hui Yang, Email: hui-yang@sjtu.edu.cn

Ran Zhuo, Email: ranzhuo@shnu.edu.cn

2. Arrangement

会议报告

时间：2025 年 4 月 26 日-27 日

地点：上海交通大学闵行校区理科楼 6 号楼 208 室

会议住宿

上海市闵行区沪闵路 1577 号, 上海闵行白金汉爵大酒店

会议班车

	出发地→到达地	时间
4.26 早晨	白金汉爵大酒店→会场	08:30
4.26 中午	会场→学术活动中心	11:50
4.26 中午	学术活动中心→会场→白金汉爵大酒店	13:00
4.26 中午	白金汉爵大酒店→会场	13:40
4.26 晚上	会场→白金汉爵大酒店	17:40

自行入校：关注“上海交通大学”官方微信号，点击菜单栏“校外访客”进行入校填报

会议联系人

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上海市沿源科技园
理科群楼
东下院
中国银行
中国农业银行
(闵行校区)

4. Title and Abstract

Scattering theory and inverse scattering theory in hyperbolic space

Lu Chen (Beijing Institute of Technology)

In this talk, we introduce a theoretical framework for time-harmonic wave scattering on hyperbolic spaces. Using the limiting absorption principle (LAP), we derive the explicit forms of the ingoing and outgoing Green functions of the Helmholtz operator of hyperbolic spaces and use them to establish the ingoing and outgoing radiation conditions, which are analogues to the Sommerfeld radiation conditions in the Euclidean setting. We also discuss a hyperbolic Rellichs type theorem which guarantees that the scattered field as well as its far-field pattern are uniquely defined. Finally, we introduce the inverse obstacle problem on hyperbolic space. To our best knowledge, the theoretical framework is new to the literature and it paves the way for many subsequent developments for wave scattering on hyperbolic spaces.

Real $(n-1)$ Monge-Ampere equation in bounded and unbounded domains

Feida Jiang (Southeast University)

In this talk, we consider the solvability of the $(n-1)$ Monge-Ampère equation. By imposing proper assumptions on the weight, bounded solutions and large solutions are obtained in the whole Euclidean space. Moreover, the infinite Dirichlet boundary value problem is studied in a bounded strictly convex domain.

A Serrin-type over-determined problem for Hessian equations in the exterior domain

Zhizhang Wang (Fudan University)

In this talk, we consider the Hessian equation in some exterior domain with prescribed?asymptotic behavior at infinity and Dirichlet Neumann conditions on the interior boundary.

Non-compactness for the spinorial Yamabe-type problems

Tian Xu (Zhejiang Normal University)

Let $(M; g;\ )$ be an m-dimensional closed spin manifold, with a fixed Riemannian metric g and a fixed spin structure ; let $\mathbb{S}(M)$ be the spinor bundle over M. The spinorial Yamabe-type problems address the solvability of the following equation

$$D_g\ = f(x)|\ |_g^{\frac{2}{m-1}}\ ;\qquad : M \to \mathbb{S}(M);\ x \in M$$

where D_g is the associated Dirac operator and $f : M \to \mathbb{R}$ is a given function. This talk aims to establish non-compactness results related to the spinorial Yamabe-type problems. Compared with the classical Yamabe problem, some new phenomena will appear.

The direct moving sphere for fractional Laplace equation

Hui Yang (Shanghai Jiao Tong University)

In this talk, we will introduce the direct method of moving spheres and establish a Liouville-type theorem for the fractional elliptic equation with general non-linearity f. One of the key improvements over the previous work is that we do not require the usual Lipschitz condition. In fact, we only assume the structural condition that $f(t)t^{-\frac{n+\alpha}{n-\alpha}}$ is monotonically decreasing. This differs from the usual approach such as Chen-Li-Li (Adv. Math. 2017), which needs the Lipschitz condition on f, or Chen-Li-Zhang (J. Funct. Anal. 2017), which relies on both the structural condition and the monotonicity of f. We also use the direct method of moving spheres to give an alternative proof for the Liouville-type theorem of the fractional Lane-Emden equation in a half space.

An anisotropic weighted isoperimetric inequality and its applications

Maochun Zhu (Nanjing University of Science and Technology)

In this talk, I will report our recent work on an anisotropic weighted isoperimetric inequality. Based on this isoperimetric inequality, we can obtain a classification result for the singular Liouville equation involving the Finsler N-Laplacian, and show the existence of extremals for the anisotropic singular Trudinger-Moser inequalities on any bounded domains through the blow-up analysis. Finally, combining this isoperimetric inequality and the anisotropic n-harmonic transplantation, we obtained the optimal concentration level of the anisotropic singular and nonsingular Trudinger-Moser functional.

Qualitative analysis on some nonlinear problems with fractional and higher-order fractional Laplace

Ran Zhuo (Shanghai Normal University)

In this talk, we establish the Liouville-type theorems for nonlinear equations involving the fractional and higher-order fractional Laplacian. By employing the Liouville-type theorems, we further derive a priori estimates for solutions to the equations.