宁波东方理工大学·宁波大学
联合应用分析研讨会
会议手册 Manual



中国·宁波
2026.09.27-29

宁波東方理工大學
EASTERN INSTITUTE OF TECHNOLOGY, NINGBO

数学科学学院
School of Mathematical Sciences
Eastern Institute of Technology, Ningbo

宁波大学 数学与统计学院
NINGBO UNIVERSITY SCHOOL OF MATHEMATICS AND STATISTICS

math@eitech.edu.cn
copyright©东方理工数学科学学院

CONTENT

学院介绍
About the Schools 1

会议介绍
About the Joint Workshop 2

地图
Maps 3

交通信息
Transportation 5

日程表
Schedule 7

特邀报告
Invited Talks 9

笔记
Note 15

Organizers

Min Chen 陈敏, Sicheng Liu 刘思秉, Changzheng Qu 屈长征, Kaijian Sha 沙凯健, Jie Shen 沈捷, Xiaoming Wang 王晓明

Contact

Kaijian Sha	kjsha@eitech.edu.cn	13361932164
Sicheng Liu	liusicheng@nbu.edu.cn	13713801193

Meeting Affairs

Xijiao Wu	xwu@eitech.edu.cn

Wifi Information

EIT-GUEST，eduroam



学院介绍
About the Schools

宁波东方理工大学数学科学学院

一、学院简介

数学是现代科技创新的基石，我院致力于汇聚顶尖人才，打造高水平国际化数学教研平台。学院拥有多位国家高层次人才领衔的国际化教研团队，在计算数学、偏微分方程、概率统计、量子计算等多个领域活力充沛。核心特色是推动数学与物理、数据科学、人工智能等领域深度交叉，营造宽松包容的学术氛围，鼓励探索与合作。

二、学院定位

打造国内一流、国际有影响力的数学科学学院，成为基础研究高地、应用创新枢纽、顶尖人才摇篮。以国家战略和前沿科学为导向，兼顾基础与交叉，为学术、人才培养和社会发展提供坚实数学支撑。构建“基础研究+交叉应用+人才培育”三位一体发展格局，以数学智慧赋能未来。

三、学科发展

面向未来，聚焦重点方向，推动学科高质量发展：
重点方向：优化与机器学习、概率统计、数学建模，计算流体\材料力学及与量子计算等新兴学科的交叉领域。
核心目标：瞄准国家战略与前沿难题，强化优势、培育新增长点，打造特色学科体系。

宁波大学数学与统计学院

宁波大学数学与统计学院的历史可以追溯到1958年8月成立的宁波师范学院数学系。学院有数学一级学科博士点和数学学科博士后科研流动站，以及多个省市级教学科研平台，包括十四五省级基础学科拔尖学生培养基地和和浙江省非线性科学理论、计算及应用国际合作基地。数学与应用数学专业是国家级一流本科专业和宁波市一流专业（A类）。数学学科系“十四五”浙江省一流学科（B类）和宁波市 “161”工程登峰学科。

学院师资力量雄厚，现有教职工104人，其中包括浙江省特级专家1人、国家杰出青年科学基金获得者1人、国家级高层次人才1人、国家级青年人才4人、教育部新世纪优秀人才2人、浙江省杰出青年科学基金获得者4人。在偏微分方程和几何分析， 可积系统， 分形几何、代数学、科学计算和组合数学等领域成果显著，近五年在国际知名学术期刊上发表论文500余篇，主持科研项目140余项，总经费达4600余万元，其中国家自然科学基金面上项目等国家级项目37项，省部级项目26项。获浙江省自然科学奖二等奖、浙江省教学成果奖二等奖和浙江省数学会科研成果一等奖等奖项。 人才培养成效显著，获全国挑战杯金奖，互联网+省赛金奖1项和全国大学生数学建模竞赛国家一等奖等奖项。已成为浙东地区人才培养的摇篮和基地。

会议介绍
About the Joint Workshop

为促进非线性分析与偏微分方程领域的学术交流与合作，宁波东方理工大学与宁波大学联合举办“应用分析研讨会”。本次会议以非线性分析与偏微分方程为主题，涵盖非线性偏微分方程理论、动力系统及相关交叉应用。会议采用邀请报告与自由讨论结合的形式，邀请相关领域专家学者分享最新研究成果。通过报告与讨论，会议旨在深化非线性分析与偏微分方程前沿问题的探讨，并推动相关理论在工程与科学问题中的应用。

To promote academic exchange and collaboration in nonlinear analysis and partial differential equations, Eastern Institute of Technology and Ningbo University are jointly organizing *The Joint Workshop on Applied Analysis*. The workshop will focus on nonlinear analysis and partial differential equations, covering nonlinear partial differential equation theory, dynamical systems, and related interdisciplinary applications. It will consist of invited talks and open discussions, bringing together experts and scholars from related fields to share their latest research findings. Through presentations and discussions, the workshop aims to deepen exploration of frontier issues in nonlinear analysis and PDEs and promote the application of relevant theories to engineering and scientific problems.

Invited external experts

Jiaxu Li 李嘉旭 Shenzhen University	**Zhiwu Lin 林治武** Fudan University	**Hao Liu 刘浩** University of Macau
Yuming Qin 秦玉明 Donghua University	**Chunyou Sun 孙春友** Donghua University	**Edriss S. Titi** University of Cambridge and The Weizmann Institute of Science
Rongnian Wang 王荣年 Shanghai Normal University	**Chunjing Xie 谢春景** Shanghai Jiao Tong University	**Qian Yuan 袁谦** Chinese Academy of Sciences
Rong Zhang 张荣 Nanchang University	**Feng Zhou 周风** East China Normal University	



地图 Maps



宁波大学 Ningbo University ↑

← 宁波东方理工大学 Eastern Institute of Technology, Ningbo



1 雅戈尔图书馆 YOUNGOR LIBRARY
2 教学实验楼 TEACHING & LABORATORY BUILDING
3 教学楼 ACADEMIC BUILDING
4 信息楼 INFORMATION TECHNOLOGY BUILDING
5 盛威楼 SAFEWELL BUILDING（SCHOOL OF BUSINESS）
6 办公楼 EXECUTIVE BUILDING
7 行政楼 ADMINISTRATION BUILDING
8 人文社科楼 HUMANITIES AND SOCIAL SCIENCES BUILDING
9 郑坚・利红楼（工学楼） ZHENG JIAN AND GONG LIHONG BUILDING（ENGINEERING BUILDING）
10 生命科学楼 LIFE SCIENCES BUILDING
11 化学材料楼 CHEMISTRY AND MATERIALS SCIENCE BUILDING
12 公共科研楼 CENTRAL RESEARCH BUILDING
13 电子楼 ELECTRONICS BUILDING
14 数理楼 MATHEMATICS AND PHYSICS BUILDING
15 文博中心 UNIVERSITY CULTURAL CENTER
16 求真塔 QIUZHEN TOWER
17 教授之家 FACULTY CLUB
18 食堂 DINING HALL
19 学生活动中心 STUDENT CENTER
20 教师宿舍区 FACULTY HOUSING
21 学生宿舍区 RESIDENCE HALLS
22 综合体育馆 RECREATION CENTER
23 静园 SERENITY GARDEN
24 东区体育场 EAST STADIUM
25 垃圾收集中心 WASTE COLLECTION CENTER
26 动物实验中心 — LAB
27 材料中心&危险品暂存中心 — LAB

交通信息
Transportation

会议酒店
Conference Hotel

宁波镇海开元名都酒店
New Century Hotel Zhenhai, Ningbo

地址：浙江省宁波市镇海区庄市街道庄市大道788号
Address: No. 788 Zhuangshi Avenue, Zhenhai District, Ningbo, Zhejiang

从宁波站出发
From Ningbo Railway Station

出租车 / 网约车
从宁波站乘坐出租车或网约车前往“宁波镇海开元名都酒店”，全程约15公里，正常路况下约35分钟，费用约人民币45–60元。

By Taxi or Ride-Hailing Service
Take a taxi or ride-hailing service from Ningbo Railway Station to “New Century Hotel Zhenhai, Ningbo.” The journey is approximately 15 km and normally takes about 35 minutes. The estimated fare is RMB 45–60.

从宁波栎社国际机场出发
From Ningbo Lishe International Airport

出租车 / 网约车
从宁波栎社国际机场乘坐出租车或网约车前往“宁波镇海开元名都酒店”，全程约34公里，正常路况下约45分钟，费用约人民币70–90元。

By Taxi or Ride-Hailing Service
Take a taxi or ride-hailing service from Ningbo Lishe International Airport to “New Century Hotel Zhenhai, Ningbo.” The journey is approximately 34 km and normally takes about 45 minutes. The estimated fare is RMB 70–90.

以上时间和费用仅供参考，可能因交通状况而有所变化。
Travel times and fares are approximate and may vary depending on traffic conditions.

9月28日班车安排
Shuttle Bus on September 28

会议组委会将安排班车往返于会议酒店、宁波东方理工大学和宁波大学。
具体安排如下：

08:30 镇海开元名都酒店一楼大堂集合
08:40 镇海开元名都酒店 - 宁波东方理工大学
12:30 宁波东方理工大学 - 镇海开元名都酒店
13:30 镇海开元名都酒店一楼大堂集合
13:40 镇海开元名都酒店 - 宁波大学
17:10 宁波大学 - 镇海开元名都酒店

The conference organizers will provide shuttle services between the conference hotel, EIT, and the School of Mathematics and Statistics, Ningbo University.
The schedule is as follows:

08:30 Meet in the lobby of New Century Hotel Zhenhai, Ningbo
08:40 Hotel - EIT
12:30 EIT - Hotel
13:30 Meet in the lobby of New Century Hotel Zhenhai, Ningbo
13:40 Hotel - Ningbo University
17:10 Ningbo University - Hotel



日程表
Schedule

9月27日

镇海开元名都酒店
New Century Hotel Zhenhai, Ningbo

TIME	PROGRAM
15:00-19:00	Registration

9月28日

宁波东方理工大学盛威楼106室
Room 106, Safewell Building，EIT

TIME	SPEAKER	PROGRAM	HOST
09:10-09:20		Opening Ceremony	
09:20-09:50	Feng Zhou	Maximal hypersurfaces with singularities in Lorentz-Minkowski space	Xiaoming Wang
09:50-10:20	Zhiwu Lin	Magnetic Expulsion in Steady Magnetohydrodynamic Flows	Sicheng Liu
10:20-10:50		Break	
10:50-11:20	Chunyou Sun	Attractors for a semi-dissipative 2D Boussinesq system	Min Chen
11:20-11:50	Jiaxu Li	Shallow water equations with surface tension and contact lines: Derivation, well-posedness, and global stability	Qian Yuan
11:50-14:00		Lunch & Campus tour	

9月28日

宁波大学数学与统计学院317室
Room 317, School of Mathematics and Statistics, Ningbo University

TIME	SPEAKER	PROGRAM	HOST
14:00-14:30	Yuming Qin	Local-in-time wellposedness for 2D compressible magneto-micropolar boundary layer equations in Sobolev spaces	Edriss S. Titi
14:30-15:00	Rongnian Wang	Invariant Manifolds and Finite-Dimensional Reduction for Infinite-Dimensional Dynamical Systems	Ze Li
15:00-15:30		Break	
15:30-16:00	Hao Liu	On the rigidity and existence of self-similar solutions to the Navier-Stokes Equations	Li Li
16:00-16:30	Shengxin Li	Structural stability of Prandtl boundary layers in the entire subsonic regime	Kaijian Sha
16:30-17:00	Edriss S. Titi	On energy conservation for inviscid hydrodynamic equations: generalisations of Onsager ‘s conjecture	Changzheng Qu
17:30-20:00		Dinner	

9月29日

宁波东方理工大学数理楼405
Room405, Mathematics and Physics Building, EIT

TIME	PROGRAM
Morning	Free discussion

特邀报告
Invited Talks

Feng Zhou

East China Normal University

Maximal hypersurfaces with singularities in Lorentz-Minkowski space

We study the maximal hypersurfaces with multiple light-cones in Lorentz-Minkowski space by considering the weak solutions to the mean curvature equation with multiple Dirac masses in Lorentz–Minkowski space and using an approximation argument. This is a joint work with HY Chen and Y Wang.

Bio: 周风教授，1980年本科就读武汉大学数学系。1985年公派留学法国,1993年获得巴黎第六大学数学博士学位。1993至1995年在法国EVRY大学数学系任助教。1995至1997年在华东师范大学数学系进行博士后研究工作。2001年晋升为数学教授。2004年至2012年任华东师范大学数学系系主任。曾入选为上海市曙光学者，上海市优秀学科带头人。曾主持教育部和国家外专局的“数学创新引智”计划。其研究领域为非线性偏微分方程。主要感兴趣于研究几何、数学物理中非线性偏微分方程解的性态及相关问题。研究成果发表在CPAM，Ann. I.H.P.，JFA, Calc. Var. and PDEs., JDE, Science China 等数学期刊上。

Zhiwu Lin

Fudan University

Magnetic Expulsion in Steady Magnetohydrodynamic Flows

Magnetic expulsion is the tendency of a recirculating flow to remove magnetic flux from its interior. I will discuss a rigorous realization of this phenomenon for steady two-dimensional viscous and resistive MHD flows in a disk, in the simultaneous vanishing-dissipation limit.
Under a single-eddy and non-Alfvénic condition, we construct solutions consisting of an ideal-MHD core and a coupled MHD boundary layer. A new MHD analogue of the classical Wood formula determines both limiting fields from the boundary circulations. In particular, zero magnetic circulation leads to magnetic expulsion from the eddy interior, while nonzero circulation selects a uniform magnetic rotation. I will describe this selection mechanism and the main analytical ideas, including matched asymptotic expansions and nonlinear stability estimates for the coupled MHD boundary layer. This is a joint work with Chen Gao and Jianfeng Zhao.

Bio: 林治武，北京大学学士、东京大学硕士、布朗大学博士。曾任美国佐治亚理工学院教授，2024年起任复旦大学教授、相辉学者，入选国家级高层次人才计划。主要研究偏微分方程、动力系统及其在数学物理中的应用，重点关注天体物理、流体力学与等离子体模型中的稳定性、失稳机制和长期动力学行为。

Chunyou Sun

Donghua University

Attractors for a semi-dissipative 2D Boussinesq system

In this talk, I will report our recent results about the structure of the weak σ-attractor $\mathcal{A}$ of a semi-dissipative 2D Boussinesq system that with viscosity and without heat diffusion.

Bio: 孙春友，东华大学教授、博士生导师。主要从事无穷维动力系统、非线性分析方面的研究工作。相关工作发表在《Math. Ann.》、《Trans. Amer. Math. Soc.》、《Izv. Math.》、《J. Math. Pures Appl.》、《Indiana Univ. Math. J.》、《SIAM J. Math. Anal.》、《J. Differential Equations》等学术期刊上。

Jiaxu Li

Shenzhen University

Shallow water equations with surface tension and contact lines: Derivation, well-posedness, and global stability

We consider the one-dimensional shallow water problem with capillary surfaces and moving contact lines. The shallow water equations are derived from the two-dimensional water wave equations in the asymptotic regime where the depth of the water is small. The contact lines are set to have constant contact angles, and become the free boundary at the level of shallow water equations. Moreover, the depth of the shallow water degenerates near the free boundary, which causes singularities for the derivatives due to the loss of uniform parabolicity. We identify a concave and compact equilibrium state of the system, and the global stability of the equilibrium is established in this paper. This is joint work with Prof. Xin Liu and Dr. Dirk Peschka.

Bio:李嘉旭，深圳大学博士后，2021年博士毕业于中国科学院数学与系统科学研究院。主要从事可压缩Navier-Stokes方程适定性方面的研究，相关结果发表在ARMA, SIAM JMA, CVPDE, JDE等期刊。

Yuming Qin

Donghua University

Local-in-time wellposedness for 2D compressible magneto-micropolar boundary layer equations in Sobolev spaces

In this talk, we shall consider the two-dimensional compressible magneto-micropolar boundary layer equations on the half-plane, which are derived from 2D compressible magneto-micropolar fluid equations with the non-slip boundary condition on velocity, Dirichlet boundary condition on micro-rotational velocity and perfectly conducting boundary condition on magnetic field. Based on a nonlinear coordinate transformation, we first prove the local-in-time well-posedness for the compressible magneto-micropolar boundary layer system in Sobolev spaces, provided that initial tangential magnetic field is non-degenerate.

Bio: 秦玉明，东华大学二级教授、博士生导师，复旦大学博士、巴西国家科技部科学计算实验室博士后，东华大学非线性科学研究所所长，校第九届学位评定委员会委员，原数学系主任，数学科负责人，数学一级博士点开点负责人，国家一流本科专业点建设负责人; 现任6个国际期刊的编委，美国《Mathematical Reviews》特约评论员，国家自然科学基金委、国家留学基金委项目通讯评议专家，第十四届中国数学学会理事，学术交流工作委员会会员，中国工业与应用数学学会理事，上海市工业与应用数学学会理事、学术委员会委员，上海市非线性科学学会常务理事、副理事长，上海市学位委员会第五届学科评议组成员，2018年-2020年、2022年-2023年和2025年上海市自然科学奖数理(力)组评审专家; 曾任河南大学特聘教授，河南省学术技术带头人。主持承担30多项省部级以上科研项目，其中主持完成河南省杰出青年科学基金1项、国家自然科学基金5项、国家自然科学基金委国际合作交流项目3项、国家自然科学基金委天元项目1项、科技部国际合作项目1项、教育部高级外聘专家项目5项、上海市国际合作项目1项等; 参与完成国家自然科学基金重点项目1项、中德国际交流合作项目1项。主要研究非线性发展方程适定性及其无穷维动力系统，在Springer出版社出版学术专著9部，在科学出版社和法国EDP Sciences出版社联合出版学术专著4部，在《ARMA》、《JMPA》、《JDE》、《M3AS》等国际重要核心期刊上发表学术论文140余篇; 多次受邀访问美国、德国、瑞士、意大利、巴西、捷克及中国香港、台湾等多所大学和研究所，受邀80余次在国内外学术会议上作学术报告，组织8次国际学术会议; 曾获河南省科委、教育厅优秀科研成果奖多项，获河南省优秀留学回国人员荣誉称号并获成就奖，2010年荣获东华大学第三届校长奖，2015年获上海市自然科学奖二等奖。

Rongnian Wang

Shanghai Normal University

Invariant Manifolds and Finite-Dimensional Reduction for Infinite-Dimensional Dynamical Systems

In this talk, I will give an introduction of recent advances in the theory of global finite-dimensional invariant manifolds for infinite-dimensional dynamical systems. I will discuss key issues such as how to construct such manifolds, their recurrence and smoothness. Finally, from the viewpoint of finite-dimensional reduction, I will show how this theory helps us better understand and characterize the long-time behavior of infinite-dimensional systems.

Bio: Rongnian Wang is a professor at Shanghai Normal University. He received his Ph.D. in Pure Mathematics from the University of Science and Technology of China. His research focuses on differential equations and dynamical systems, particularly well-posedness of (stochastic) evolution equations, topological regularity of solution sets, long-time dynamics, invariant manifolds, and ergodicity of invariant measures. He has published in journals such as International Mathematics Research Notices 、 Mathematische Annalen 、 Journal de Mathématiques Pures et Appliquées（Liouville’ s Journal）、SIAM Journal on Mathematical Analysis、Journal of Functional Analysis、SIAM Journal on Applied Dynamical Systems、Journal of Dynamics and Differential Equations、Journal of Differential Equations 、 Discrete and Continuous Dynamical Systems. He has led three NSFC General Programs, one NSFC Young Scientist Program, and multiple provincial-level grants, and has authored a Springer monograph. He has held visiting positions at institutions in Romania, Austria, the USA, Canada, and Hong Kong.

Hao Liu

University of Macau

On the rigidity and existence of self-similar solutions to the Navier-Stokes Equations

Scale invariant or self-similar solutions, play important roles in the understanding of the regularity and asymptotic structures of the general solutions to the Navier-Stokes equations. In this talk, we talk about rigidity and existence results of large solutions of scale invariant type to steady Navier-Stokes equations in high dimensions and to the unsteady Navier-Stokes equations in two dimensions.

Bio: 刘浩博士目前在澳门大学担任博士后研究员。他在南方科技大学取得学士学位，在香港大学取得博士学位，曾在上海交通大学担任博士后研究员。他的研究兴趣集中在非线性偏微分方程和随机控制等相关领域。主要研究成果发表在JEMS, SIMA, CVPDE, JDE等国际期刊上。

Shengxin Li

Ningbo University

Structural stability of Prandtl boundary layers in the entire subsonic regime

Despite their physical significance, there are limited mathematical theories for the compressible Navier-Stokes equations with strong boundary layers. In this talk, I will introduce the structural stability of shear flow boundary layer profiles for the two-dimensional steady compressible Navier-Stokes equations. The stability estimates are uniform across the entire subsonic regime, characterized by Mach numbers $m\in (0,1)$. As a byproduct, we provide the first rigorous justification of the low Mach number limit in the presence of Prandtl boundary layers. This talk is based on the joint work with Prof. Tong Yang and Zhu Zhang.

Bio: 李圣鑫，2016-2023上海交通大学博士，导师谢峰教授；2023-2026香港理工大学博士后，导师杨彤教授；研究方向，流动稳定性与边界层理论。

Edriss S. Titi

University of Cambridge and The Weizmann Institute of Science

On energy conservation for inviscid hydrodynamic equations: generalisations of Onsager’s conjecture

Onsager’s conjecture, which relates the conservation of energy to the regularity of weak solutions of the Euler equations, was completely resolved in recent years. In this lecture, we pursue an analogue of Onsager’s conjecture in the context of the hydrostatic Euler equations (also known as the inviscid primitive equations of oceanic and atmospheric dynamics). In this case the relevant conserved quantity is the horizontal kinetic energy. We first consider the standard notion of weak solutions which are commonly used in literature. We show that if the horizontal velocity (u, v) is sufficiently regular then the horizontal kinetic energy is conserved. Interestingly, the spatial Hölder regularity exponent which is sufficient for energy conservation in the context of the hydrostatic Euler equations is 1/2 and hence larger than the corresponding regularity exponent for the Euler equations (which is 1/3). This is due to the anisotropic regularity of the velocity field: Unlike the Euler equations, in the case of the hydrostatic Euler equations the vertical velocity w is one degree spatially less regular with respect to the horizontal variables, compared to the horizontal velocity (u, v). Since the standard notion of weak solution is not able to deal with this anisotropy properly, we introduce two new notions of weak solutions for which the vertical part of the nonlinearity is interpreted as a paraproduct. We finally present several sufficient conditions for such weak solutions to conserve energy.

Bio: Professor Edriss S. Titi holds the Nonlinear Mathematical Sciences Professorial Chair at the University of Cambridge. He is a Fellow of the American Mathematical Society, SIAM, the John Simon Guggenheim Memorial Foundation, and the Institute of Physics (UK). His distinguished career has been recognized with numerous international honors, including the Humboldt Research Award and the Einstein Visiting Fellowship. Professor Titi's research spans rigorous analysis, computational mathematics, and applications to fluid mechanics. He is internationally renowned for his pioneering contributions to the mathematical theory of the Euler and Navier - Stokes equations, as well as geophysical fluid dynamics and turbulence.

NOTE

NOTE

NOTE

NOTE

NOTE

NOTE