

Week 7 (Oct.23-Oct.27)

Topic: Axi-symmetric Navier-Stokes Equations

Workshop Room: Room 2201, Guanghua East Building, Fudan University

Invited Speakers:

Mikhail Korobkov (Fudan University)

Weixi Li (Wuhan University)

Jiri Neustupa (Czech Academy of Sciences Mathematical Institute)

Xuecheng Wang (Princeton University)

Shangkun Weng (Wuhan University)

Yifei Wu (Center for Applied Mathematics of Tianjin University)

Ting Zhang (Zhejiang University)

Organizing Committee:

Peter Constantin (Princeton University)

Yoshikazu Giga (University of Tokyo)

Hao Jia (University of Chicago)

Carlos Kenig (University of Chicago)

Zhen Lei (Fudan University)

Fanghua Lin (Courant Institute of Mathematical Sciences)

Gregory Seregin (University of Oxford)

Vladimir Sverak (University of Minnesota)

Edriss Titi (Texas A & M University)

Sijue Wu (University of Michigan)

Sponsored by

Shanghai Center for Mathematical Sciences
School of Mathematical Sciences, Fudan University

For further information, please contact

Ke Han (hanke@fudan.edu.cn)

Zhen Lei (zlei@fudan.edu.cn)

Schedule

2017 Fall Program on Analysis of PDE (Sept. 11 – Dec. 2, 2017)

Week 7 (Oct.23-Oct.27)	
Topic: Axi-symmetric Navier-Stokes Equations	
Monday (October 23) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Hao Wu
9:35 – 10:25	Jiri Neustupa
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair: Jiri Neustupa
10:50 – 11:40	Xuecheng Wang
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: -
14:35 – 15:30	-
15:40 – 16:40	-
16:40 – 17:00	-
17:00 – 17:05	Chair: -
17:05 – 17:55	-
Tuesday (October 24) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Yifei Wu
9:35 – 10:25	Ting Zhang
10:25 – 10:45	Tea Break and Group Photo
10:45 – 10:50	Chair: Ting Zhang
10:50 – 11:40	Yifei Wu

Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: -
14:35 – 15:35	-
15:45 – 16:45	-
16:45 – 17:10	-
Wednesday (October 25) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Hao Wu
9:35 – 10:25	Shangkun Weng
10:25 – 10:45	Tea Break
10:45 – 10:50	
10:50 – 11:40	
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: -
14:35 – 15:25	-
15:25 – 15:45	-
15:45 – 15:50	Chair: -
15:50 – 16:40	-
Thursday (October 26) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: -
9:35 – 10:25	-
10:25 – 10:45	-
10:45 – 10:50	Chair: -
10:50 – 11:40	-
Lunch Break	
Afternoon Session	

14:30 – 14:35	Chair: -
14:35 – 15:25	-
15:25 – 15:45	-
15:45 – 15:50	Chair: -
15:50 – 16:40	-
Friday (October 27) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Weixi Li
9:35 – 10:25	Mikhail Korobkov
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair: Hao Wu
10:50 – 11:40	Weixi Li
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: -
14:35 – 15:25	-
15:25 – 15:45	-
15:45 – 15:50	Chair: -
15:50 – 16:40	-

2017 Fall Program on Analysis of PDE

Week 7 (Oct.23-Oct.27)

Topic: Axi-symmetric Navier-Stokes Equations

Titles and Abstracts:

Speaker: Mikhail Korobkov

Title:

Abstract:

Speaker: Weixi Li

Title: Well-posedness in Gevrey function space for the Prandtl equations

Abstract: In this talk we will present our recent results on the well-posedness in the Gevrey space for the Prandtl equation. We prove that the Prandtl equation is well-posed in Gevrey space with Gevrey index lying in $[1,2]$ for 2D case with non-degenerate critical points and for 3D case with one monotonic tangential velocity flow. Joint work with Tong Yang.

Speaker: Jiri Neustupa

Title: Modelling of a flow past a rotating and translating body, stability of a steady flow

Abstract: We briefly derive a mathematical model of a flow past a rotating and translating body, mention the the main known results, and further pay attention to the question of stability of a "steady" flow U (i.e. steady in a coordinate system attached to the body). Although the problem is formulated in an exterior domain, we show that sufficient conditions for stability can be formulated in terms of an appropriate behavior of a semigroup generated by an associated linear operator, applied to a finite family of suitable functions. We do not impose any condition of "smallness" of the steady flow U .

Speaker: Xuecheng Wang

Title: Global regularity for the 3D finite depth capillary waves system

Abstract: We will talk about the global regularity, scattering, and the non-existence of small traveling waves for the $3D$ finite depth capillary waves system for small initial data. In particular, the bottom is assumed to be flat.

Speaker: Shangkun Weng

Title: 3-D axisymmetric subsonic flows with nonzero swirl for the compressible Euler-Poisson system

Abstract: We address the structural stability of 3-D axisymmetric subsonic flows with nonzero swirl for the steady compressible Euler-Poisson system in a cylinder supplemented with suitable boundary conditions. A

special Helmholtz decomposition of the velocity field is introduced for 3-D axisymmetric flow with a nonzero swirl component. The new mathematical ingredient lies in the solvability of a singular elliptic equation which concerns the angular component of the vorticity in its cylindrical representation, and in analysis of streamlines near the axis $r=0$. This is a joint work with Myoungjean Bae.

Speaker: Yifei Wu

Title: Large global solution for the nonlinear Schrodinger equation

Abstract: In this talk, we give some space-time estimates. As an application, we construct a class of global solutions which is arbitrary large in the critical Sobolev space and even in Lebesgue space in some cases.

Speaker: Ting Zhang

Title: Some wellposedness results for 3D axisymmetric Navier-Stokes system and Boussinesq system

Abstract: In this talk, we study the three-dimensional axisymmetric Navier-Stokes system with nonzero swirl. By establishing a new key inequality for the pair $(\frac{\omega^r}{r}, \frac{\omega^\theta}{r})$, we get several Prodi-Serrin type regularity criteria based on the angular velocity, u^θ . Moreover, we obtain the global well-posedness result if the initial angular velocity u_0^θ is appropriate small in the critical space $L^3(\mathbb{R}^3)$. Furthermore, we investigate the global well-posedness for the 3-D inhomogeneous incompressible Navier-Stokes system with the axisymmetric initial data. We prove the global well-posedness provided that $\|\frac{a_0}{r}\|_{\infty}$ and $\|u_0^\theta\|_3$ are sufficiently small, and obtain some decay estimates. At last, considering the 3D axisymmetric Boussinesq system with nonzero swirl, we obtain the global existence and uniqueness of the strong solutions (u, ρ) , when $\|r^d u_0^\theta\|_{L^{\frac{3}{1-d}}}$, $d \in [0, 1]$, is sufficiently small, and get some decay estimates. (Based on joint works with Hui Chen, Daoyuan Fang and Wenjun Le)

Participants:

Yuan Cai (Fudan University)
Tuowei Chen (Fudan University)
Xiufang Cui (Fudan University)
Bobo Hua (Fudan University)
Zhentao Jin (Fudan University)
Zhen Lei (Fudan University)
Weixi Li (Wuhan University)
Fanghua Lin (Courant Institute)
Guowei Liu (Shanghai Jiaotong University)
Song Liu (Chinese Academy of Science)
Xiang Luo (University of Science and Technology of China)
Jiri Neustupa (Czech Academy of Sciences Mathematical Institute)
Yun Pu (Fudan University)
Aifang Qu (Shanghai Normal University)
Peng Qu (Fudan University)
Jiajun Tong (Courant Institute)
Chenmu Wang (Fudan University)
Xiaoming Wang (Fudan University & Shanghai Center for Mathematical Sciences)
Xuecheng Wang (Princeton University)
Yanyan Wang (Fudan University)
Yucong Wang (Xiamen University)
Shangkun Weng (Wuhan University)
Hao Wu (Fudan University)
Sijue Wu (University of Michigan)
Xiaochun Wu (Fudan University)
Yifei Wu (Center for Applied Mathematics of Tianjin University)
Meng Yuan (Nanjing University)
Lan Zhang (Wuhan University)
Jing Zhang (Fudan University)
Ting Zhang (Zhejiang University)
Na Zhao (Fudan University)
Yi Zhou (Fudan University)