Week 1 (Sep.11-Sep.15)

Topic: Incompressible Navier-Stokes Equations

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

Lecture Series Speakers: Yoshikazu Giga (University of Tokyo)
Qi Zhang (University of California, Riverside)

Invited Speakers: Ning Jiang(Wuhan University),
Hajime Koba(Osaka University)
Hideo Kozono(Waseda University)
Jiri Neustupa(Czech Academy of Sciences Mathematical Institute)
Ping Zhang(Chinese Academy of Sciences)
Zhifei Zhang(Peking University)
Yi Zhou (Fudan 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 Minesota)
Edriss Titi (Texas A & M University)
Sijue Wu (University of Michigan)

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Schedule

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

Week 1 (Sept.11-Sept.15)	
Topic: Incompressible Navier-Stokes Equations	
Monday (September 11)　　Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair：Fanghua Lin, Jun Li
9:35 – 10:25	Yoshikazu Giga
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair：Yoshikazu Giga
10:50 – 11:40	Ping Zhang
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: Yi Zhou
14:35 – 15:25	Qi Zhang
15:25 – 15:45	Tea Break
15:45 – 15:50	Chair：Qi Zhang
15:50 – 16:40	Jiri Neustupa
Tuesday (September 12)　　Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair：Fanghua Lin
9:35 – 10:25	Yoshikazu Giga
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair：Yoshikazu Giga
10:50 – 11:40	Hajime Koba
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: Yi Zhou

14:35 – 15:25	Qi Zhang
15:25 – 15:45	Tea Break
Group Photo	**15:45 – 16:00**
16:00 – 16:05	Chair：Qi Zhang
16:05 – 16:55	Ning Jiang
Wednesday (September 13) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair：Fanghua Lin
9:35 – 10:25	Yoshikazu Giga
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair：Yoshikazu Giga
10:50 – 11:40	Hideo Kozono
Lunch Break	
Thursday (September 14) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair：Fanghua Lin
9:35 – 10:25	Yoshikazu Giga
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair：Yoshikazu Giga
10:50 – 11:40	Zhifei Zhang
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: Yi Zhou
14:35 – 15:25	Qi Zhang
15:25 – 15:45	Tea Break
Friday (September 14) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair：Fanghua Lin
9:35 – 10:25	Qi Zhang

2017 Fall Program on Analysis of PDE

Week 1 (Sep.11-Sep.15)

Topic: Incompressible Navier-Stokes Equations

Titles and Abstracts:

Speaker: Hajime Yoshikazu Giga
Title: On L^\infty theory for the Navier-Stokes equations and its applications to regularity criteria via vorticity direction

Abstract: It is well known that the Navier-Stokes equations is locally-in-time well-posed in various function spaces. However, it is quite recent that such problems are discussed in spaces of bounded functions when the domain has boundaries even for the Stokes equations initiated by K. Abe and the author (2013).In the series of lectures, we recall this theory and discuss its application, especially to regularity criteria via vorticity directions developed by H. Miura and the author (2011) and later by P. Hsu, Y. Maekawa and the author (2014) for a half space. The crucial step for this application consists of Liouville type theorems for spatially non-decaying functions.

Here is a short list of topics:

1. Regularity criteria based on vorticity direction

2. Liouville type theorems

3. The Navier-Stokes equations in spaces of bounded functions

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Speaker: Hajime Koba
Title: On the Helmholtz-Weyl decomposition on surfaces and its application to fluid dynamics.

Abstract: We study the Helmholtz-Weyl decomposition of vector-valued functions on a surface. We prove that we can divide a function on the surface into the three parts such as the surface divergence-free part, the surface gradient term, and the mean curvature term. We also apply the Helmholtz-Weyl decomposition to derive incompressible fluid systems on an evolving surface. This is a joint work with Yoshikazu Giga (University of Tokyo) and Chun Liu (Penn State University).

Speaker: Jiri Neustupa
Title: A Contribution to the Theory of Regularity of a Weak Solution to the Navier-Stokes Equations via One Component of Velocity or the Negative Part of Pressure

Abstract： We deal with a suitable weak solution ($\mathbf{v}$,p) to the Navier-Stokes equations in Omega x (0,T), where Omega is a domain in R3, T>0 and v=(v_1,v_2,v_3). We show that the regularity of (v,p) at any point ($\mathbf{x}$, t) in Omega x (0,T) is essentially determined by the Serrin-type integrability of the positive part of a certain linear combination of v_1^2, v_2^2, v_3^2 and p in a backward neighborhood of ($\mathbf{x}$,t). An appropriate choice of the coefficients in this linear combination leads to the Serrin-type condition on one component of $\mathbf{v}$ or, alternatively, on the negative part of p.

Speaker: Qi Zhang
Title: Ancient solutions to some parabolic equations.
Abstract: The classical Liouville theorem says that positive solutions of the Laplace equation in R^n are constants. Is it true for the heat equation in space time? The answer is no. We will survey recent results and applications by a number of people in this direction and their extension to nonlinear equations and systems, such as Navier Stokes equations. Some open questions will be discussed.

Speaker: Ping Zhang

TBA

Speaker: Zhifei Zhang

TBA

Speaker: Yi Zhou

TBA

Speaker: Ning Jiang

TBA

Participants:

Yoshikazu Giga (University of Tokyo)

Bobo Hua (Fudan University)

Ning Jiang(Wuhan University),

Hajime Koba(Osaka University)

Hideo Kozono(Waseda University)

Zhen Lei (Fudan University)

Hui Li (Peking University)

Xiang Luo (University of Science and Technology of China)

Jiri Neustupa(Czech Academy of Sciences Mathematical Institute)

Peng Qu (Fudan University)

Jiawei Sun(Capital Normal University)

Houzhi Tang(Capital Normal University)

Hao Wu (Fudan University)

Meng Yuan(Nanjing University)

Qi Zhang (University of California, Riverside)

Ping Zhang(Chinese Academy of Sciences)

Zhifei Zhang(Peking University)

Qidi Zhang (Chinese Academy of Sciences)

Yi Zhou (Fudan University)