

Week 11 (Nov.20 - Nov.24)

Topic: Boundary Layer Problem and Liquid Crystal

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

Lecture Series Speakers: Changyou Wang (Purdue University)

Invited Speakers:

Tao Huang (NYU Shanghai)

Yuning Liu (NYU Shanghai)

Edriss Titi (Texas A&M University and The Weizmann Institute of Science)

Wei Wang (Zhejiang University)

Yong Yu (Chinese University of Hong Kong)

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 11 (Nov.20-Nov.24)	
Topic: Boundary Layer Problem and Liquid Crystal	
Monday (November 20) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Fanghua Lin
9:35 – 10:25	Changyou Wang
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair: Zhen Lei
10:50 – 11:40	Edriss Titi
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: Changyou Wang
14:35 – 15:25	Yong Yu
15:25 – 15:45	Tea Break
15:45 – 15:50	Chair: --
15:50 – 16:40	--
Tuesday (November 21) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Edriss Titi
9:35 – 10:25	Changyou Wang
10:25 – 10:45	Tea Break and Group Photo
10:45 – 10:50	Chair: Edriss Titi
10:50 – 11:40	Changyou Wang
Lunch Break	

Afternoon Session	
14:30 – 14:35	Chair: Changyou Wang
14:35 – 15:25	Edriss Titi
15:25 – 15:45	Tea Break
15:45 – 15:50	Chair: Yong Yu
15:50 – 16:40	Tao Huang
Wednesday (November 22) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Peng Qu
9:35 – 10:25	Changyou Wang
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair: Changyou Wang
10:50 – 11:40	Edriss Titi
Lunch Break	
Afternoon Session	
14:30 – 14:35	Chair: --
14:35 – 15:25	--
15:25 – 15:45	Tea Break
15:45 – 15:50	Chair: --
15:50 – 16:40	--
Thursday (November 23) Room 2201, Guanghua East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: Yuning Liu
9:35 – 10:25	Wei Wang
10:25 – 10:45	Tea Break
10:45 – 10:50	Chair: Wei Wang
10:50 – 11:40	Yuning Liu
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 (November 24) Room 2201, Guanghai East Building, Fudan University	
Morning Session	
9:30 – 9:35	Chair: --
9:35 – 10:25	--
10:25 – 10:45	Tea Break
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	--

2017 Fall Program on Analysis of PDE

Week 11 (Nov.20 – Nov.24)

Topic: Boundary Layer Problem and Liquid Crystal

Titles and Abstracts:

Speaker: Tao Huang

Title: Axisymmetric nematic liquid crystal flows

Abstract: In this talk, we will discuss the existence of global regular solution to the initial and boundary problem of axisymmetric nematic liquid crystal flow in dimension three under the assumption that the initial data of the orientation field of liquid crystal molecules $d_0 \in \mathbb{S}^2_+$ (upper hemisphere).

Speaker: Yuning Liu

Title: On the scaling limit of Onsager's molecular model for liquid crystals

Abstract: We study the small Deborah number limit of the Doi-Onsager equation for the dynamics of nematic liquid crystals. This is a Smoluchowski-type equation that characterizes the evolution of a number density function, depending upon both particle position and its orientation vector, which lies on the unit sphere. We prove that, when the Deborah number tends to zero, the family of solutions with rough initial data near local equilibria will converge to a local equilibrium distribution prescribed by a weak solution of the harmonic map heat flow into the sphere. This flow is a special case of the gradient flow to the Oseen-Frank energy functional for nematic liquid crystals and the existence of its global weak solution was first obtained by Y.M Chen, using Ginzburg-Landau approximation. Our result can be considered as a kinetic proof of this classical result. The key ingredient is to show the strong compactness of the family of number density functions and the proof relies on the strong compactness of the corresponding second moment (or the Q-tensor), a spectral decomposition of the linearized operator near the limit local equilibrium distribution, as well as the energy dissipation estimate.

Speaker: Edriss Titi

Title:

- (1) On some classical and not so classical results concerning the Navier-Stokes and Euler equations (Part I)
 - (2) Is dispersion a stabilizing or destabilizing mechanism? Landau-damping induced by fast background flows
 - (3) On some classical and not so classical results concerning the Navier-Stokes and Euler Equations (Part II)
-

Speaker: Changyou Wang

Title: Some Recent Progress on Analysis of Ericksen-Leslie System and Related Topics

Abstract: In this series of talk, I will give an overview on the Ericksen-Leslie system that models the hydrodynamics of nematic liquid crystals, and discuss some recent works on the mathematical analysis on such a

system including the existence of global Leray-Hopf type weak solutions in dimension three for certain initial data obtained. I will also review a continuum model on biaxial nematics, which is a reduced version of Landau-De Gennes Q-tensor theory, and discuss a partial regularity for the corresponding equilibrium solutions in dimension three, and existence of a global almost regular solution to the hydrodynamic equation of biaxial nematics. This is based on joint works with F. H. Lin, T. Huang, C. Liu, and J. Y. Lin.

Speaker: Wei Wang

Title: TBA

Abstract:

Speaker: Yong Yu

Title: Some global solutions in the simplified Ericksen-Leslie equation

Abstract: In this talk, I am going to discuss some recent results on global solutions of simplified Ericksen-Leslie equation in 2D. Three unstable phenomena will be addressed. They are oscillation instability, concentrated instability for twisted solutions and Freedericksz transition with applied magnetic field strength.

Participants:

Yuan Cai (Fudan University)
Hongge Chen (Wuhan University)
Tuowei Chen (Fudan University)
Xiufang Cui (Fudan University)
Zaihui Gan (Tianjin University)
Daoyin He (Fudan University)
Bobo Hua (Fudan University)
Tao Huang (NYU Shanghai)
Zhentao Jin (Fudan University)
Zhen Lei (Fudan University)
Jinkai Li (Chinese University of Hong Kong)
Fanghua Lin (Courant Institute)
Guowei Liu (Shanghai Jiaotong University)
Song Liu (Chinese Academy of Science)
Junren Luo (Fudan University)
Yuning Liu (NYU Shanghai)
Xiang Luo (University of Science and Technology of China)
Yun Pu (Fudan University)
Peng Qu (Fudan University)
Edriss Titi (Texas A&M University and The Weizmann Institute of Science)
Jiajun Tong (Courant Institute)
Changyou Wang (Purdue University)
Chenmu Wang (Fudan University)
Wei Wang (Zhejiang University)
Xiaoming Wang (Fudan University & Shanghai Center for Mathematical Sciences)
Yanyan Wang (Fudan University)
Yucong Wang (Xiamen University)
Hao Wu (Fudan University)
Xiaochun Wu (Fudan University)
Yong Yu (Chinese University of Hong Kong)
Meng Yuan (Nanjing University)
Lan Zhang (Wuhan University)
Jing Zhang (Fudan University)
Na Zhao (Fudan University)
Yi Zhou (Fudan University)