

“Workshop on Kinetic Equation: Theory and Analysis”

会议信息

“Workshop on Kinetic Equation: Theory and Analysis” 将于 2017 年 08 月 26-28 日在上海交通大学举行。本次会议受国家自然科学基金委资助，旨在邀请本领域活跃的专家学者一起讨论“动理学中的数学理论”的最新研究进展，并就大家感兴趣的一些问题进行探讨、交流。

组织委员会

王维克（主席，上海交通大学）
王亚光（上海交通大学）
李亚纯（上海交通大学）
谢 峰（上海交通大学）
邓师瑾、方北香、顾琪龙、刘成杰
王海涛、谢春景、杨雄锋(上海交通大学)

会议联系人

杨雄锋（上海交通大学） Tel: 13817646008

会议时间: 2017 年 8 月 26 日-2017 年 8 月 28 日

会议地点: 上海市闵行区上海交通大学数学科学学院大会议室

会议注册时间: 2017 年 8 月 26 日

会议报到与住宿地点: 上海市闵行区曼哈顿酒店

(地址: 上海市闵行区鹤庆路 900 号碧江广场 5-6 号楼曼哈顿酒店)

交通信息:

➤ 从浦东机场出发,

方案一: 乘坐出租车, 经 S32 (申嘉湖高速) 到剑川路下高速, 然后到曼哈顿酒店, 时间 50-60 分钟, 费用 220 左右。

方案二: 可搭乘地铁 2 号线至人民广场站换乘地铁 1 号线, 乘至莘庄站换乘地铁 5 号线, 乘 5 号线金平路站下车。下车后步行至酒店, 时间大约 2 小时 30 分钟。或者乘坐机场 9 线至终点站莘庄下车, 步行至莘庄地铁站乘坐 5 号线, 时间大约 2 小时 30 分钟。

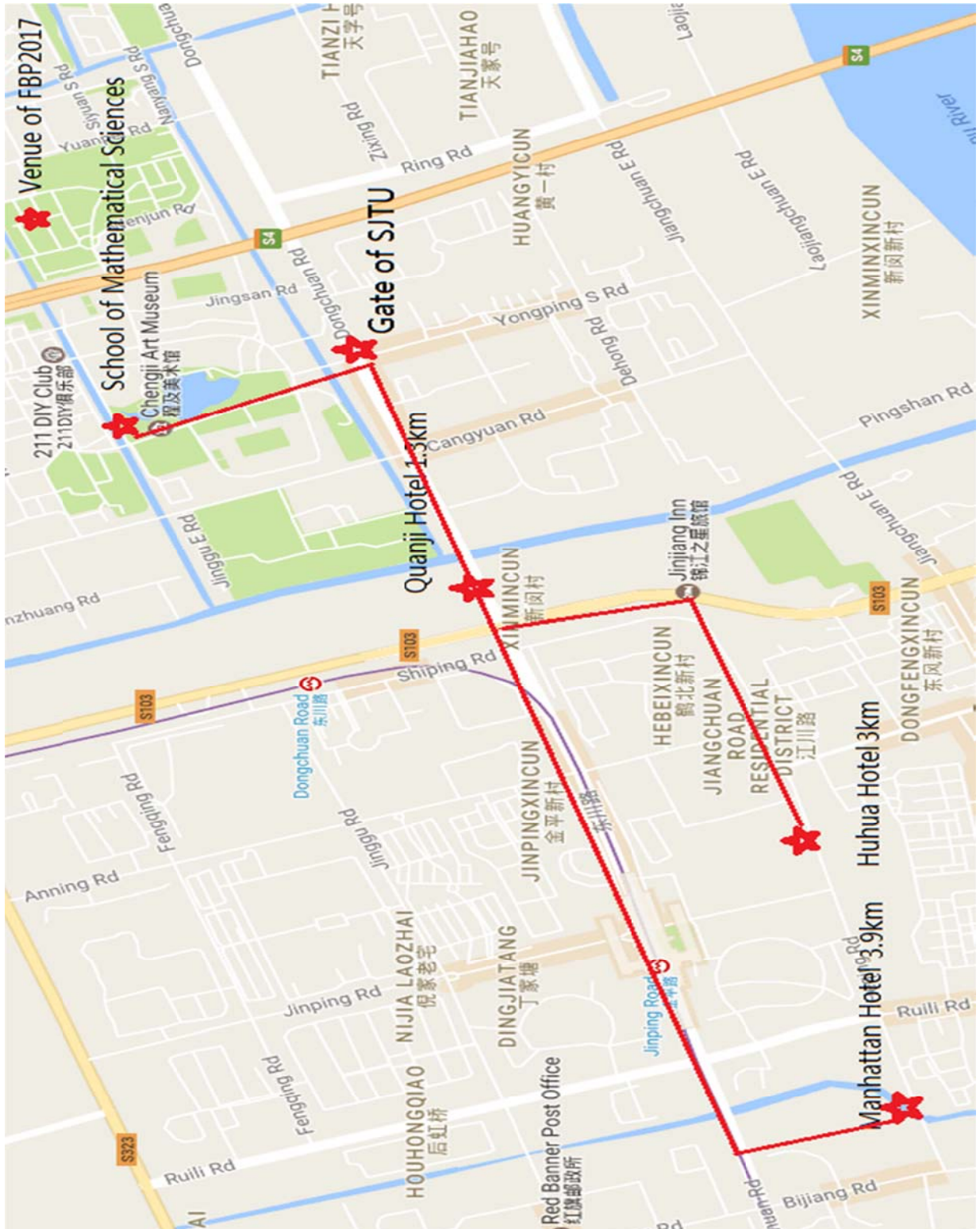
➤ 从虹桥火车站或者虹桥机场出发

方案一: 从南广场乘坐出租车经嘉闵高架到曼哈顿酒店, 时间 40-50 分钟, 费用 100 左右; 乘坐出租车经外环高架到曼哈顿酒店, 时间 35-45 分钟, 费用 150 左右。

方案二: 乘坐虹桥枢纽 4 号线 (或者 5 号线) 至东川路下车, 然后步行至酒店, 时间大约 1 小时 30 分钟。

方案三: 可搭乘地铁 2 号线至人民广场站 (或地铁 10 号线在陕西南路站) 换乘地铁 1 号线, 乘至莘庄站换乘地铁 5 号线, 乘 5 号线金平路站下车。下车后步行至酒店, 时间大约 2 小时。

住宿酒店位置:



车辆行程安排

我们将安排汽车从曼哈顿酒店到上海交大数学科学学院来往巴士，时间安排如下：

日期	时间	路线
8月27日	8:20	Manhattan Hotel –School of Mathematical Sciences, SJTU
	18:00	School of Mathematical Sciences, SJTU – Manhattan Hotel
8月28日	7:50	Manhattan Hotel –School of Mathematical Sciences, SJTU
	18:00	School of Mathematical Sciences, SJTU – Manhattan Hotel

晚宴

晚宴安排在8月27日晚6:30在曼哈顿酒店旁的相遇十年饭店，欢迎每一位参加会议的老师和同学参加。

会议安排

Day 1: Aug. 27, Sunday Lecture Hall (100-L), Math Building

Morning Session	
8:50-9:00	开幕式
Session 1	9:00--11:50 Chair: Yachun Li (李亚纯)
	Chaojiang Xu (徐超江)
9:00--9:50	<i>The Cauchy problem for radially symmetric homogeneous Boltzmann equation with Shubin class initial datum and Gelfand-Shilov smoothing effect</i>
	Huijiang Zhao (赵会江)
10:00--10:50	<i>One-dimensional compressible Navier-Stokes equations with Temperature-dependent viscosity</i>
	Yi Wang (王益)
11:00--11:50	<i>Basic wave patterns in some kinetic equations</i>
11:50--14:00	留圆餐厅午餐
Afternoon Session	
Session 1	14:00--15:40 Chair: Xianwen Zhang (张显文)
	Jie Liao (廖杰)
14:00--14:50	<i>Stability of global Maxwellian for non-linear Fokker-Planck equations</i>
	Hongjun Yu (喻洪俊)
14:50--15:40	<i>On the Cauchy problem of the relativistic Boltzmann equation with soft potentials</i>
15:40--16:00	Tea/Coffee Break
Session 2	16:00--17:40 Chair: Hailiang Li (李海梁)
	Fucal Li (栗付才)
16:00--16:50	<i>Strong solutions to the compressible Navier-Stokes-Vlasov-Fokker-Planck equations</i>
	Mingying Zhong (钟明滢)
16:50--17:40	<i>Spectrum structure and behaviors of the Vlasov-Maxwell-Boltzmann systems</i>
18:30--	晚宴

Day 2: Aug. 28, Monday Lecture Hall (100-L), Math Building

Morning Session	
Session 1	08:20--10:00 Chair: Chaojiang Xu (徐超江)
08:20--09:10	Hailiang Li (李海梁) <i>Behavior of Navier-Stokes (Euler)-Fokker-Planck equations</i>
09:10--10:00	Xianwen Zhang (张显文) <i>On the 3-D Vlasov-Poisson system with point charges</i>
10:00--10:20	Tea/Coffee Break
Session 2	10:20--11:50 Chair: Huijiang Zhao (赵会江)
10:20--11:10	Shuangqian Liu (刘双乾) <i>Compressible Navier-Stokes approximation to the Boltzmann equation in bounded domains</i>
11:10--12:00	Ning Jiang (江宁) <i>Self-organized hydrodynamics-Navier-Stokes coupled system: well-posedness and rigorous derivation</i>
12:00--14:00	留圆餐厅午餐
Afternoon Session	
Session 1	14:00--15:40 Chair: Fucai Li (栗付才)
14:00--14:50	Yong Wang (王勇) <i>Effects of soft interaction on long-time dynamics of rarefied gas with non-isothermal diffuse boundary</i>
14:50--15:40	Qinghua Xiao (肖清华) <i>The optimal temporal decay of the Vlasov-Poisson-Boltzmann (Landau) system</i>
15:40--16:00	Tea/Coffee Break
Session 2	16:00--17:40 Chair: Feng Xie (谢峰)
16:00--16:50	Yuanjie Lei (雷远杰) <i>Global in time limit from the Vlasov-Maxwell-Boltzmann system to the Vlasov-Poisson-Boltzmann system in the perturbative framework</i>
16:50--17:40	Haitao Wang (王海涛) <i>Explicit structure of the Fokker-Planck equation with flat confinement</i>
18:30--	晚餐

Titles and abstracts

Self-organized hydrodynamics Navier-Stokes coupled system: well-posedness and rigorous derivation

Ning Jiang (江宁)

Wuhan University

Abstract: Recently, P. Degond and his collaborators formally derived coupled self-organized hydrodynamics Navier-Stokes system for suspensions of active particles. We proved the well-posedness of this system, and justify the limit from the kinetic-fluid model. This is a joint work with Yi-long Luo and Teng-fei Zhang.

Global in time limit from the Vlasov-Maxwell-Boltzmann system to the Vlasov-Poisson-Boltzmann system in the perturbative framework

Yuanjie Lei (雷远杰)

Huazhong University of Science and Technology

Abstract: We give a rigorous global in time mathematical justification of the limit from the Vlasov-Maxwell-Boltzmann system to the Vlasov-Poisson-Boltzmann system in the perturbative framework as the light velocity tends to infinity. This is a joint work with Prof. Jiang Ning and Prof. Zhao Huijiang.

Strong solutions to the compressible Navier-Stokes-Vlasov-Fokker-Planck equations

Fucaï Li (栗付才)

Nanjing University

Abstract: A kinetic-fluid model describing the evolutions of disperse two-phase flows is considered. The model consists of the Vlasov-Fokker-Planck equation for the particles (disperse phase) coupled with the compressible Navier-Stokes equations for the fluid (fluid phase) through the friction force. The friction force depends on the density, which is different from many previous studies on kinetic-fluid models and is more physical in modeling but significantly more difficult in analysis. New approach and techniques are introduced to deal with the strong coupling of the fluid and the particles. The global well-posedness of strong solution in the three-dimensional whole space is established when the initial data is a small perturbation of some given equilibrium. Moreover, the algebraic rate of convergence of solution toward the equilibrium state is obtained.

Behaviors of Navier-Stokes(Euler)-Fokker-Planck equations

Hailiang Li (李海梁)

Capital Normal University

Abstract: We consider the behaviors of global solutions to the initial value problems for the multi-dimensional compressible Navier-Stokes (Euler)-Fokker-Planck equations. It is shown that due the micro-macro coupling effects, the sound wave type of propagation of this NSFP or EFP system for two-phase fluids is observed with the wave speed determined by the two-phase fluids. The phenomena could not be observed for the pure Fokker-Planck equation.

Stability of global Maxwellian for non-linear Fokker--Planck equations

Jie Liao (廖杰)

East China University of Science and Technology

Abstract: In this talk, we will discuss the stability of global Maxwellian for non-linear Fokker--Planck equations in the whole space by uniform-in-time energy estimates. The decay rates of the nonlinear model is also considered by using the precise spectral analysis of the linearized Fokker--Planck operator. This is a joint work with Qianrong Wang and Xiongfeng Yang.

Compressible Navier-Stokes approximation to the Boltzmann equation in bounded domains

Shuangqian Liu (刘双乾)

Jinan University

Abstract: In this talk, I will report our recent study on the compressible Navier-Stokes approximation to the Boltzmann equation with diffuse boundary condition.

Explicit structure of the Fokker-Planck equation with flat confinement

Haitao Wang (王海涛)

Shanghai Jiao Tong University

Abstract: We study the pointwise (in both space and time variables) behavior of the Fokker-Planck Equation with flat confinement. The solution has very accurate description, including the initial layer, large time behavior and spatially asymptotic behavior. The initial layer is dominated by Kolmogorov-Fokker-Planck solution, the large time behavior is dominated by diffusion fluid wave, and the solution decays exponentially at space-like region. Moreover, the structure of the solution highly depends on the potential function.

Basic wave patterns in some kinetic equations

Yi Wang (王益)

Academy of Mathematics and Systems Science

Abstract: First, I will talk about the hydrodynamic limit of the Boltzmann equation to the compressible Euler equations in the setting of 1D generic Riemann solutions, which is the superposition of three basic wave patterns to Euler equations, i.e., shock wave, rarefaction wave and contact discontinuity. Then I will show our recent results about the nonlinear stability of these three basic wave patterns to the bipolar Vlasov-Poisson-Boltzmann system based on a new micro-macro type decomposition around the local Maxwellian to the system.

Effects of soft interaction on long-time dynamics of rarefied gas with non-isothermal diffuse boundary

Yong Wang (王勇)

Academy of Mathematics and Systems Science

Abstract: In this talk, we study the Boltzmann equation with soft potentials $-3 < \gamma < 0$. Firstly, we construct a nontrivial steady Boltzmann solution. Secondly, we study the large time behavior of Boltzmann solution to a nontrivial steady solution under small perturbation. Finally, we study the large time behavior of Boltzmann solution to a nontrivial steady solution with a class of large amplitude initial data. This is a joint work with Renjun Duan, Feimin Huang and Zhu Zhang.

The optimal temporal decay of the Vlasov-Poisson-Boltzmann (Landau) system

Qinghua Xiao (肖清华)

Wuhan Institute of physics and mathematics

Abstract: In this talk, we mainly discuss the optimal temporal decay of the Vlasov-Poisson-Boltzmann (Landau) Systems. We show that for the Vlasov-Poisson-Landau system, the optimal temporal decay of the solution including the highest order derivatives can be derived. However, for the Vlasov-Poisson-Boltzmann system, we can only obtain the optimal temporal decay of highest order derivatives of the solution for the non-cutoff case with the angular singularity parameter $s \geq 1/2$.

The Cauchy problem for radially symmetric homogeneous Boltzmann equation with Shubin class initial datum and Gelfand-Shilov smoothing effect

Chao-Jiang Xu (徐超江)

Rouen University and Wuhan University

Abstract: In this work, we study the Cauchy problem for radially symmetric homogeneous non-cutoff Boltzmann equation with Maxwellian molecules, the initial datum belongs to Shubin space of the negative index which can be characterized by spectral decomposition of the harmonic oscillators. The Shubin space of the negative index contains the measure functions. Based on this spectral decomposition, we construct the weak solution with Shubin class initial datum, we also prove that the Cauchy problem enjoys Gelfand-Shilov smoothing effect, meaning that the smoothing properties are the same as the Cauchy problem defined by the evolution equation associated to a fractional harmonic oscillator.

On the Cauchy problem of the relativistic Boltzmann Equation with soft potentials

Hongjun Yu (喻洪俊)

South China Normal University

Abstract: In this talk we discuss about the existence and large time behavior of the global classical solution for the Cauchy problem of the relativistic Boltzmann equation with soft potentials.

On the 3-D Vlasov-Poisson System with Point Charges

Xianwen Zhang (张显文)

Huazhong University of Science and Technology

Abstract: A new energy functional, which is shown to decay to zero as time tends to infinite, is introduced for the three-dimensional Vlasov-Poisson plasma in the presence of heavy point charges with repulsive interaction. Moreover, a new kind of pointwise energy of a plasma particle relative to each point charge is also constructed and the variation of its root is shown to be controlled by the electrostatic fields. Based on those results, we prove global existence and uniqueness of a classical solution possibly having infinite kinetic energy, but with compact “velocity-spatial support”. Furthermore, for the single point charge-Vlasov-Poisson plasma, global existence and polynomial propagation of “velocity-spatial moments” of weak solutions are also established. (joint work with Donghao Li)

One-dimensional compressible Navier-Stokes equations with Temperature-dependent viscosity

Huijiang Zhao (赵会江)

Wuhan University

Abstract: This talk is concerned with the construction of global smooth large-amplitude non-vacuum solutions to one-dimensional compressible Navier-Stokes equations with temperature-dependent viscosity for general gases.

Spectrum Structure and Behaviors of the Vlasov-Maxwell-Boltzmann Systems

Mingying Zhong (钟明漾)

Guangxi University

Abstract: In this talk, we study the spectrum structures and behaviors of the Vlasov-Maxwell-Boltzmann (VMB) systems for both two species and one species. The analysis shows the effect of the Lorentz force induced by the electro-magnetic field leads to some different structure of spectrum from the classical Boltzmann equation and the closely related Vlasov-Poisson-Boltzmann system. And the significant difference between the two-species VMB model and one-species VMB model are given. The structure in high frequency illustrates the hyperbolic structure of the Maxwell equation. Furthermore, the long time behaviors and the optimal convergence rates to the equilibrium of the VMB systems for both two species and one species are established based on the spectrum analysis.

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