

2021 年非线性偏微分方程理论学术会议

腾讯会议 ID: 468 3242 7019

2021 年 10 月 16 日 (星期六)				
时间	报告题目	报告人	主持人	
上	8:30-8:40	开幕式	中国地质大学 (武汉) 数理学院领导	郭艳凤
	8:40-9:40	Well-posedness for the initial boundary problem of the derivative nonlinear Schrödinger equation on the half-line and the inviscid limit behavior of the one-dimensional Ginzburg-Landau equation	霍朝辉 (中国科学院数学与系统科学研究院)	王明
	午	9:40-10:40	On the primitive equations of the large-scale atmosphere and ocean	
10:40-11:40		Inertial manifolds for some dissipative systems	孙春友 (兰州大学)	
午间休会				
下	14:30-15:30	两类非线性随机微分方程的显式数值逼近	黄建华 (国防科技大学)	王明
	15:30-16:30	Convergence problem of Schrödinger equation in Fourier-Lebesgue spaces with rough data and random data	闫威 (河南师范大学)	
午	16:30-17:30	The decay behavior of global solutions of the isentropic compressible Euler equations with source terms in \mathbb{R}^d	吴兴龙 (武汉理工大学)	

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上午	8:30-9:30	Compressible Euler limit from Boltzmann equation with Maxwell reflection boundary condition in half-space	罗益龙 (华南理工大学)	张腾飞
	9:30-10:30	Local well-posedness and sensitivity analysis for the self-organized kinetic model	张增 (武汉理工大学)	
	10:30-11:30	Entropy inequality and energy dissipation of inertial Qian-Sheng model for nematic liquid crystals	唐少君 (武汉理工大学)	
下午	14:30-17:30	自由讨论		

报告摘要

注：按报告先后为序

Well-posedness for the initial boundary problem of the derivative nonlinear Schrödinger equation on the half-line and the inviscid limit behavior of the one-dimensional Ginzburg-Landau equation

霍朝辉 中国科学院数学与系统科学研究院

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Abstract. Global well-posedness of the initial boundary of the derivative nonlinear Schrödinger equation on the half-line with initial data satisfying $\|u_0\|_{L^2} < \sqrt{2\pi}$,

$$u_t - iu_{xx} = (|u|^2 u)_x, \quad x \geq 0$$

is considered. Moreover, the inviscid limit behavior of the one-dimensional Ginzburg-Landau(GGL) equation on the half-line

$$u_t - (\varepsilon + i)u_{xx} + (|u|^2 u)_x = 0, \quad \varepsilon > 0, x \geq 0$$

can be considered. If $\varepsilon \rightarrow 0$, the solution of the generalized Ginzburg-Landau(GGL) equation on the half-line converges the solution of the Schrödinger equations with derivative on the half-line.

On the primitive equations of the large-scale atmosphere and ocean

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Abstract. In this talk, we give some results on the primitive equations of the large-scale ocean. Firstly, we recall the global well-posedness and long-time dynamics for the viscous primitive equations describing the large-scale oceanic. Secondly, we introduce our results on the viscous primitive equations describing the large-scale atmospheric and oceanic motions.

Inertial manifolds for some dissipative systems

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Abstract. This talk will focus on our recent works about the existence of inertial manifolds for several dissipative systems, including a simple singularly non-autonomous model and the complex Ginzburg-Landau equations. This is a joint work with A.Kostianko, Xinhua Li, and S.Zelik.

两类非线性随机微分方程的显式数值逼近

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摘要: 本报告将介绍两类非线性随机微分方程的显式数值逼近。首先, 针对一类随机 SIS 传染病模型, 将对数变换与 Euler-Maruyama (EM) 方法相结合构造了一种保正的显式数值方法。该数值方法不仅可以保持原随机微分方程的正域, 而且在有限时域内具有 $p>0$ 阶矩意义下的一阶强收敛率。另一方面, 针对一类具有超线性增长漂移系数和 Holder 连续扩散系数的一维随机微分方程。最近, [Yang, Wu, Kloeden and Mao, J. Comput. Appl. Math. 2020] 应用 [Mao, J. Comput. Appl. Math. 2015] 首次提出的截断技术, 建立了该类随机微分方程截断 EM 方法的强收敛率。然而, 截断函数需要一定限制, 有时可能会迫使步长过小, 以至于截断 EM 方法不适用。出于这个原因, 我们的主要目标是利用新的截断技术构造部分截断 EM 方法, 并在理论上建立不受这些限制的强收敛率。此外, 还将介绍部分截断 EM 方法的稳定性。最后, 给出了一些例子和数值仿真来说明我们理论结果的可行性和有效性。

Convergence problem of Schrödinger equation in Fourier-Lebesgue spaces with rough data and random data

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Abstract. In this talk, we consider the convergence problem of Schrödinger equation. Firstly, we show the almost everywhere pointwise convergence of Schrödinger

equation in Fourier-Lebesgue spaces $\hat{H}^{\frac{1}{p}, \frac{p}{2}}(\mathbb{R})$ ($4 \leq p < \infty$) with rough data. Secondly, we show that the maximal function estimate related to one dimensional Schrödinger equation can fail with data in $\hat{H}^{s, \frac{p}{2}}(\mathbb{R})$ ($s < \frac{1}{p}$). Finally, we show the stochastic continuity of Schrödinger equation with random data in $\hat{L}^r(\mathbb{R}^n)$ ($2 \leq r < \infty$) almost surely.

The decay behavior of global solutions of the isentropic compressible Euler equations with source terms in \mathbb{R}^d

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Abstract. In this talk, we first establish the existence and uniqueness of global smooth solution provided the initial data is sufficiently small, which tells us that the damping terms can prevent the development of singularity in small amplitude. Next, under the additional smallness assumption, the large time behavior of solution is investigated, which extends and improves the results obtained by Sideris et al. in CPDE.

Compressible Euler limit from Boltzmann equation with Maxwell reflection boundary condition in half-space

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Abstract. In this talk, we will introduce the compressible Euler limit from the scaled Boltzmann equation with Maxwell reflection boundary condition in half-space. Starting from the local-in-time classical solution to the compressible Euler system with impermeable boundary condition in half-space, employing the coupled weak viscous layers (governed by linearized compressible Prandtl equations with Robin boundary condition) and linear kinetic boundary layers, and the analytical tools in [Guo-Jang-Jiang-2010-CPAM] and some new boundary estimates both for Prandtl and Knudsen layers, we proved the local-in-time existence of Hilbert expansion type classical solutions to the scaled Boltzmann equation with Maxwell reflection boundary condition with accommodation coefficient $\alpha_\epsilon = O(\sqrt{\epsilon})$ when the Knudsen

number ϵ small enough. As a consequence, this justifies the corresponding case of formal analysis in Sone's books [Sone-2002-Book, Sone-2007-Book]. This work is joint with Prof. Ning Jiang and Dr. Shaojun Tang.

Local well-posedness and sensitivity analysis for the self-organized kinetic model

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Abstract. In this talk, we consider the self-organized kinetic (SOK) model, derived as the mean field limit of the discrete Couzin-Vicsek algorithm (Degond and Motsch, Math. Models Meth. Appl. Sci., 18 (2008), pp.1193-1215). This model yields a singularity when the particle flux vanishes. By showing that the singularity does not happen in finite time, we obtain local existence and uniqueness of smooth solutions to SOK. Furthermore, due to uncertainties in the initial data and in the interaction kernel, we analyze the random SOK (RSOK) model. We provide local sensitivity analysis to justify the regularity with respect to the random parameter and stability of solutions to RSOK.

Entropy inequality and energy dissipation of inertial Qian–Sheng model for nematic liquid crystals

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Abstract. In this talk, we are concerned with the inertial Qian–Sheng model of nematic liquid crystals. We first derived the coefficients requirements from the entropy inequality, which is insufficient to guarantee energy dissipation. Then a novel Condition (H) is introduced to ensures the energy dissipation. It is proved that when both the entropy inequality and Condition (H) are obeyed, the local in time smooth solutions exist for large initial data. Furthermore, we also extended the solutions globally in time and obtained the decay of solutions on some additional conditions. This work is jointed with Prof. Ning Jiang, Dr. Yi-Long Luo and Dr. Yang-Jun Ma.