2021 年微分方程适定性理论与控制青年学者会议

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2021.06.19-2021.06.20

**中国 重庆**

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**2021 年微分方程适定性理论与控制青年学者会议**

**会议目的：**为促进微分方程研究工作，加强本领域青年学者的学术交流与合作，推动微分方程适定性理论与控制的发展，重庆大学数学与统计学院将于2021年 6月19日至6月20日举办“2021年微分方程适定性理论与控制青年学者会议”。本次会议将邀请13位80后、90后年轻学者, 围绕微分方程适定性理论与控制等数学问题报告他们最新研究成果与发展动态。

**会议主题**：微分方程分析与控制、涉及生物数学方程、色散方程、流体方程等。

**会议经费支持**：国家自然科学基金青年基金

**举办单位：**重庆大学数学与统计学院

**会议时间：**2021年6月19日-2021年6月20日

**会议地点：**腾讯会议

腾讯号：236 682 730

密码：123456

链接：<https://meeting.tencent.com/s/lrPe9aCxm6oC>

**联系人：**

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**会议日程安排****：**

**6月19日星期六下午**

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| --- | --- | --- | --- |
| 时间 | 主持人 | 报告人 | 报告题目 |
| 13:50-14:00 | 开幕式(欢迎词、合影等) |
| 14:00-14:30 | 周德芹 | 钟新(西南大学) | Nonhomogeneous heat conducting magnetohydrodynamic flows |
| 14:30-15:00 | 孙晟旻(巴黎塞尔吉大学) | Classical and semi classical bservability for the Bouendi-Grushin operator |
| 15:00-15:10 | 茶歇 |
| 15:10-15:40 | 王华桥 | 王跃循(兰州大学) | Global existence versus shock formation for some weakly dispersive equations |
| 15:40-16:20 | 何娇(巴黎萨克雷大学) | Regularity criteria for weak solutions to the three-dimensional MHD system |
| 16:20-16:50 | 郑攀(重庆邮电大学) | Some results [in a two-competing-species chemotaxis-fluid system](http://www.aimsciences.org/AIMS-Conference/conf-reg2018/display.php?id3=TWpnMk1RPT0=)  |
| 16:50-17:20 | 周寿明 | 陈恭(索邦大学) | Stability of polynomial interpolation from Neural Networks |
| 17:20-17:50 | 王艺鹏(索邦大学) | Intelligent adaptation with statistic methods—the optimal path problem |
| 17：50-18：20 | 黎升好(成都电子科技大学) | Mathematical analysis on Boussinesq systems based on Tsunami modeling |
| 18:00-20:00 | 晚餐 |

**6月20日星期天**

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| --- | --- | --- | --- |
| 时间 | 主持人 | 报告人 | 报告题目 |
| 08:30-09:00 | 王良辰 | 张林(重庆大学) | Initial-boundary value problems in Anti-de Sitter space |
| 09:00-09:30 | 周伟松(重庆邮电大学) | 无穷维随机格点FitzHugh–Nagumo系统的随机吸引子存在性分析 |
| 09：30-10：00 | 周军（西南大学） | Infinite time blow-up of solutions to a class of wave equations with weak and strong damping terms and logarithmic nonlinearity |
| 10:00-10:10 | 茶歇 |
| 10:10-10:40 | 梁闯闯 | 王明(中国地质大学) | 退化耗散与唯一延拓性不等式 |
| 10:40-11:20 | 陶为润(重庆大学) | Global existence and boundedness of weak solutions to chemotaxis (Navier) Stokes systems with p-Laplacian diffusion  |
| 11：20-12：00 | 学术交流讨论 |
| 12:00-14:00 |  午餐 |
| 14:00-18:00 | 自由交流、离会 |

**报告摘要：**

以报告人姓名首字母为序

**Stability of polynomial interpolation from Neural Networks**

陈恭 (索邦大学)

**Abstract:** Lebesgue constant is used to estimate the upper bound for interpolation error. It gives us an idea of how good the interpolant of a function is in comparison with the best polynomial approximation of the function. And it also shows the stability of the interpolation with respect noise. So Lebesgue constant may be helpful to judge the performance of neural network.

**Regularity criteria for weak solutions to the three-dimensional MHD system**

何娇 (巴黎萨克雷大学 )

**Abstract:** In this talk we will first review various known regularity criteria and partial regularity theory for 3D incompressible Navier-Stokes equations. I will then present two generalizations of partial regularity theory of Caffarelli, Kohn and Nirenberg to the weak solutions of MHD equations. The first one is based on the framework of parabolic Morrey spaces. We will show parabolic Hölder regularity for the "suitable weak solutions" to the MHD system in small neighborhoods. This type of parabolic generalization using Morrey spaces appears to be crucial when studying the role of the pressure in the regularity theory and makes it possible to weaken the hypotheses on the pressure. The second one is a regularity result relying on the notion of "dissipative solutions". By making use of the first result, we will show the regularity of the dissipative solutions to the MHD system with a weaker hypothesis on the pressure. This is a joint work with Diego Chamorro (Paris-Saclay University).

**Mathematical analysis on Boussinesq systems based on Tsunami modeling**

黎升好 (电子科技大学)

**Abstract**:We discuss several systems of equations which model surface water waves generated by a sudden bottom deformation (bump). Because the effect of such deformation is often approximated by assuming the initial water surface has a deformation (bucket). Similar modeling idea has been applied on modeling Tsunami during the past decades. This procedure is investigated and we prove rigorously that by using the correct bucket, the solutions of the regularized bump problems converge to the solution of the bucket problem.

**Classical and semi-classical observability for the Bouendi-Grushin operator**

孙晟旻 (巴黎塞尔吉大学)

**Abstract**:The observability for the classical Schrodinger equation usually holds for very short time, under suitable geometric conditions. However, it is not the case when the underlying geometry is sub-elliptic. In this talk we consider the Schrodinger equation associated with the Bouendi-Grushin operator. The Bouendi-Grushin operator is a sub-elliptic operator which is degenerate along a line. In the Bouendi case, the associated Schrodinger equation exhibits a transport e\_ect which leads to a sub-elliptic" geometric control condition and a minimal time to ensure the observability. For general Bouendi-Grushin with stronger sub-elliptic e\_ect, the observability for the Schrodinger equation is never true. These observability results can be seen from a semi-classical point of view, through a optimal re-solvent estimate. Consequently, our re-solvent estimate leads to an energy decay rate for the associated damped wave equation.

**Global existence and boundedness of weak solutions to chemotaxis(-Navier)-Stokes systems with p-Laplacian diffusion**

陶为润 (重庆大学)

**Abstract**:Chemotaxis describes the biased movement of cells in response to concentration gradients of certain diffusible chemical signals. In this talk, chemotaxis-fluid models with slow p-Laplacian are considered. We shall discuss the global existence of a chemotaxis-Navier-Stokes system and global boundedness of a chemotaxis-Stokes system. The talk is based on the joint work with Professor Yuxiang Li, Southeast University, Nanjing.

**退化耗散与唯一延拓性不等式**

王明 (中国地质大学)

**摘要:** 在无穷维动力系统的研究中，如果仅有部分区域具有耗散作用，允许其它区域无耗散作用，通常的Gronwall引理不再够用，难以建立解的一致估计（如有界吸收集存在性）。克服这一困难的有力工具是唯一延拓性不等式，它本质上描述了系统能量在不同区域上的联系。本报告将介绍我们最近关于线性薛定谔方程、热方程以及KdV方程的几个唯一延拓性不等式结果。

**Intelligent adaptation with statistic methods—the optimal path problem**

王艺朋 (索邦大学)

**Abstract**: In most numerical calculations, the calculation accuracy could always be improved by refining the discretization space or increasing the iteration numbers. However, both methods lead to the increase of computational cost. In the work, an optimal strategy is explored with the aim of balancing calculation accuracy and computational cost, using statistic methods. Some recent results will be shown and discussed.

**Global existence versus shock formation for some weakly dispersive equations.**

王跃循(兰州大学)

**Abstract:** Some results on the global existence and shock formation of some weakly dispersive equations will be reported.

**Initial-boundary value problems in Anti-de Sitter space**

张林 (重庆大学)

**Abstract**:AdS spacetime is a exact solution of Einstein vacuum equations with negative cosmological constant, and asymptotically AdS spacetime has important applications in gravitational theory and high energy physics over the past decade. In this talk, we study the initial-boundary value problems of hyperbolic equations on AdS space-time. After a conformal rescaling, we demonstrate the well-posedness for the associated null-timelike boundary problems on the conformal compactificated space. These are some toy models motivated by AdS/CFT correspondence.

**Some results [in a two-competing-species chemotaxis-fluid system](http://www.aimsciences.org/AIMS-Conference/conf-reg2018/display.php?id3=TWpnMk1RPT0=)**

郑攀 (重庆邮电大学)
**Abstract**:**:** In this talk, we consider a two-competing-species chemotaxis-fluid system with two different signals under homogeneous Neumann and Dirichlet boundary conditions in a smooth bounded domain. This system describes the evolution of two-competing species which react on two different chemical signals in a liquid surrounding environment. The cells and chemical substances are transported by a viscous incompressible fluid under the influence of a force due to the aggregation of cells. Firstly, when $N=2$ and $\kappa=1$, based on the standard heat-semigroup argument, it is proved that for all appropriately regular nonnegative initial data and any positive parameters, this system possesses a unique global bounded solution. Secondly, when $N=3$ and $\kappa=0$, by using the maximal Sobolev regularity and semigroup technique, it is proved that the system admits a unique globally bounded classical solution under some suitable conditions. Finally, by means of energy functionals and comparison arguments, it is shown that the global bounded solution of the system converges to different constant steady states, according to the different values of $a\_{1}$ and $a\_{2}$. Furthermore, we give the precise convergence rates of global solutions.

**Nonhomogeneous heat conducting magnetohydrodynamic flows**

钟新 (西南大学)

**Abstract**: In this talk, we will review recent progress on nonhomogeneous heat conducting magnetohydrodynamic flows, including the mathematical theory on the global well-posedness of strong solutions to the 2D and 3D problems.

**Infinite time blow-up of solutions to a class of wave equations with weak and strong damping terms and logarithmic nonlinearity**

周军(西南大学)

**Abstract**:This talk investigates the infinite time blow-up of solutions with arbitrary high initial energy to wave equations with weak damping term, strong damping term, and logarithmic nonlinearity. This problem has been studied previously with the assumptions that there is no strong damping term and the initial displacement and initial velocity have the same sign. However, from the physical point of view, it is obvious that the initial displacement and initial velocity may have different signs, and it is very necessary to consider the effects of the strong damping term. For example, the strong damping term indicates that the stress is not only proportional to the strain as with the Hooke law, but also proportional to the strain rate as in a linearized Kelvin–Voigt material. In this paper, by providing a completely different method from previous studies, we show that the solutions may blow up at infinity with arbitrary high initial energy when the model involves the strong damping term and the initial displacement and initial velocity may have different signs. Moreover, in this paper, we prove for the first time how to extend the solution over time (the whole half line) in studying the infinite time blow-up phenomena for hyperbolic equations with logarithmic nonlinearity. These results fill in the gaps in previous studies on this type of models.

**无穷维随机格点FitzHugh–Nagumo系统的随机吸引子存在性分析**

周伟松 (重庆邮电大学)

**Abstract**:In this talk, we will investigate a class of the existence of the random attractor of stochastic FitzHugh–Nagumo equations in an infinite lattice with multiplicative white noise. Using the Ornstein–Uhlenbeck transform, we firstly show the existence of an absorbing set, then prove that the random dynamical system is asymptotically compact. Finally, the existence of the random attractor is provided.