



2023 年非线性分析青年研讨会

程

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中国地质大学（武汉）数学与物理学院

中国地质大学（武汉）浙江研究院

2023 年 12 月 2 日



2023 年非线性分析青年研讨会

中国地质大学（武汉）于 2023 年 12 月 1-2 日举行“2023 年非线性分析青年研讨会”。会议旨在加强非线性分析理论及应用的学术交流，展示和介绍相关领域的最新成果和进展，促进青年学者的交流与合作。

会议地点：中国地质大学（武汉）南望山校区

会议时间：12 月 2 日全天（12 月 1 日报到）

特邀报告专家（以姓氏拼音为序）：

高 琦	武汉理工大学
高 足	武汉理工大学
郭 伦	中南民族大学
韩 欢	武汉理工大学
李 帅	华中农业大学
罗 勇	华中师范大学

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中国地质大学（武汉）数学与物理学院

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2023 年 11 月 22 日

会议日程安排

(会场：迎宾楼 4 号会议室)

12 月 2 日 (上午)			
8:50-9:00		开幕式及合影	
时间	主持人	报告人	报告题目
9:00-9:40	王征平	高琦	Vortices of two-component Ginzburg-Landau models
9:40-10:20	刘志苏	高足	Global gradient estimates for nonlinear parabolic operator
茶歇 (10:20-10:40)			
时间	主持人	报告人	报告题目
10:40-11:20	王春花	罗勇	Ground states of attractive Bose gases in rotating anharmonic traps
11:20-12:00	何毅	郭伦	Recent progress on high energy solutions of elliptic systems with critical growth
午餐 (12:00-14:00)			
12 月 2 日 (下午)			
时间	主持人	报告人	报告题目
14:00-14:40	张贻民	韩欢	Recent advance in variational framework for diffeomorphic image registration
14:40-15:20	蒋永生	李帅	Existence and asymptotic behavior of minimizers for rotating Bose-Einstein condensations in bounded domains
自由讨论 (15:20-17:00)			

报告题目与摘要(以姓氏拼音为序)

Vortices of Two-component Ginzburg-Landau models

高琦, 武汉理工大学

In this talk, firstly I will give a brief introduction to Ginzburg-Landau equations, then I will focus on vortex solutions of a two-component Ginzburg-Landau model in the following two settings: 1. For the model in \mathbb{R}^2 , existence, uniqueness, asymptotic behavior of vortex solutions at infinity, monotonicity and stability will be presented. 2. For the model in \mathbb{R}^3 , we recently give the existence of vortex filament solutions by Lyapunov-Schmidt reduction. The results mentioned in this talk are joint work with S. Alama, L. Duan and J. Yang.

Global gradient estimates for nonlinear parabolic operators

高足, 武汉理工大学

In this talk, we consider a parabolic equation driven by a nonlinear diffusive operator and we obtain a gradient estimate in the domain where the equation takes place. This estimate depends on the structural constants of the equation, on the geometry of the ambient space and on the initial and boundary data. As a byproduct, one easily obtains a universal interior estimate, not depending on the parabolic data. The setting taken into account includes sourcing terms and general diffusion coefficients. The results are new, to the best of our knowledge, even in the Euclidean setting, though we treat here also the case of a complete Riemannian manifold.

Recent progress on high energy solutions of elliptic systems with critical growth

郭伦, 中南民族大学

In this talk, I will introduce our recent works about high energy solutions of elliptic systems with critical growth, which includes the existence and multiplicity of non-trivial solutions for nonlinear Schrodinger system and Hartree system. Some open questions in this direction are also discussed.

Recent advance in variational framework for diffeomorphic image registration

韩欢, 武汉理工大学

Diffeomorphic image registration is a very important topic in image processing. Mathematically, it is essentially a PDE constrained variational problem. There are mainly four challenges in this field, for example, mesh folding, intensity inhomogeneity, large deformation and greedy matching. In this talk, we introduce some recent results addressing the above challenges from the aspect of mathematical modelling and theoretical analysis. These are joint works with Ke Chen, Peng Chen, Zhengping Wang, Daoping Zhang and Yimin Zhang

Existence and asymptotic behavior of minimizers for rotating Bose-Einstein condensations in bounded domains

李帅, 华中农业大学

This talk is concerned with the existence and mass concentration behavior of minimizers for rotating Bose-Einstein condensations (BECs) with attractive interactions in a bounded domain $D \subset \mathbb{R}^2$. It is shown that, there exists a finite constant a^* , denoting mainly the critical number of bosons in the system, such that the least energy $e(a)$ admits minimizers if and only if $0 < a < a^*$, no matter the trapping potential $V(x)$ rotates at any velocity $\Omega \geq 0$. This is quite different from the rotating BECs in the whole plane case, where the existence conclusions depend on the value of Ω . Moreover, by establishing the refined estimates of the rotation term and the least energy, we also analyze the mass concentration behavior of minimizers in a harmonic potential as $a \nearrow a^*$.

Ground states of attractive Bose gases in rotating anharmonic traps

罗勇, 华中师范大学

我们主要考虑了旋转位势下具有吸引力作用的玻色气体基态解问题, 其中非调和位势 $V(x) = \omega(|x|^2 + k|x|^4)$ 以旋转速度 Ω 旋转。由已有结果知, 基态解存在当且仅当 $0 < a < a^*$, 其中 a^* 是临界正常数。当 $\omega = 3\Omega^2/4, k = 1/6, a$ 趋于 a^* 且 $\Omega = C_0(a^* - a)^{-\beta}$ 时, 其中 $\beta \in [0, 1/6)$, 通过能量估计方法和极限方程的非退化性, 我们主要证明了基态解在一个很大的圆 $R(a)$ 内不存在涡旋点, 其中 $R(a)$ 的半径随着 a 趋于 a^* 趋于无穷大。