中国科学院大学
University of Chinese Academy of Sciences

International Conference on Harmonic Analysis and Its Applications

Conference Manual

University of Chinese Academy of Sciences
Yanqi Lake, Beijing, China
June 15-19, 2018

International Conference on Harmonic Analysis and Its Applications

University of Chinese Academy of Sciences

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Program for 2018 Beijing International Conference on Harmonic Analysis and Its Applications

June 16, 2018

Time	Teaching Building 1, Room 101					
9:00-9:25	Opening Ceremony: Speakers: 1) Leader from UASC; 2) Xiaochun Li (Chair: Dachun Yang)					
9:25-9:55	Photography					
	Speaker				Chair	
9:55-10:40	Detlef Müller				Heping Liu	
10:40-11:00	Tea Break					
11:00-11:45	Loukas Grafakos				Heping Liu	
11:45-13:00	Lunch					
	Teaching Building 1, Room 101		Teaching Building 1, Room 107		Teaching Building 1, Room 108	
	Speaker	Chair	Speaker	Chair	Speaker	Chair
14:30-15:15	Zhongwei Shen	Akihiko Miyachi	Jiecheng Chen	Zongguang Liu	Qiyu Sun	Zhongkai Li
15:25-16:10	Changxing Miao		Javier Duoandikoetxea		Ping Zhang	
16:10-16:30	Tea Break					
16:30-17:15	Guozhen Lu	Huoxiong Wu	Shuanglin Shao	Qingying Xue	Naohito Tomita	Zengjian Lou
18:00-20:00	Dinner					

June 17, 2018

Time	Teaching Building 1, Room 101					
	Speaker				Chair	
9:00-9:45	Camil Muscalu				Xiaochun Li	
9:55-10:40	Philip T. Gressman					
10:40-11:00	Tea Break					
	Teaching Building 1, Room 101		Teaching Building 1, Room 107		Teaching Building 1, Room 108	
	Speaker	Chair	Speaker	Chair	Speaker	Chair
11:00-11:45	Eero Saksman	Guoen Hu	Wenchang Sun	Jiman Zhao	Carlos Pérez	Yueping Zhu
11:45-13:00	Lunch					
	Speaker	Chair	Speaker	Chair	Speaker	Chair
14:30-15:15	Zhifei Zhang	Xiaohua Yao	Yongsheng Han	Zunwei Fu	Lixin Yan	Yanping Chen
15:25-16:10	Eiichi Nakai		Yoshihiro Sawano		Tao Qian	
16:10-16:30	Tea Break					
16:30-17:15	Yi Hu	Dunyan Yan	Liang Song	Bolin Ma	Shuichi Sato	Pu Zhang
18:00-20:00	Banquet					

June 18, 2018

Time	Teaching Building 1, Room 101					
	Speaker					Chair
9:00-9:45	Pekka Koskela					Guozhen Lu
9:55-10:40	Sanghyuk Lee					
10:40-11:00	Tea Break					
	Teaching Building 1, Room 101		Teaching Building 1, Room 107		Teaching Building 1, Room 108	
	Speaker	Chair	Speaker	Chair	Speaker	Chair
11:00-11:45	Yutaka Terasawa	Zhenqiu Zhang	Hong-Quan Li	Jianxun He	Rodolfo H. Torres	Yu Liu
11:45-13:00	Lunch					
	Speaker	Chair	Speaker	Chair	Speaker	Chair
14:30-15:15	Winfried Sickel	Takuya Sobukawa	Gaku Sadasue	Wengu Chen	Tapio Rajala	Katsuo Matsuoka
15:25-16:10	Renjin Jiang		Guixiang Hong		Yuan Zhou	
16:10-16:30	Tea Break					
	Teaching Building 1, Room 101					
	Speaker					Chair
16:30-17:15	Quanhua Xu					Yong Ding
18:00-20:00	Dinner					

Titles and Abstracts of Talks

Jiecheng Chen (Zhejiang Normal University)

Title: *Some Problems on Hausdorff Operators*

Abstract: In this talk, we shall mainly show some study on H^p-boundedness of Hausdorff operators for $0 < p < \infty$. We shall introduce the definition of Hausdorff operators and its extensions, the research progress on their H^p-boundedness, and some problems to be solved.

Javier Duoandikoetxea (University of the Basque Country (UPV/EHU))

Title: *From extrapolation of weights to Morrey and mixed-norm spaces*

Abstract: The original extrapolation theorem for weights says that if an operator is bounded on $L^{p_0}(w)$ for some p_0 and all the weights in the appropriate class of Muckenhoupt, then the same holds for all values of p. In this talk we show that we can go beyond the weighted Lebesgue spaces in the sense that from the assumptions of the extrapolation theorem we can deduce the boundedness of the operators on different Morrey type weighted spaces and on radial-angular mixed-norm spaces. Similar results are obtained for other versions of the extrapolation theorem (off-diagonal, restricted range). In the mixed-norm case some questions on the sharpness of quantitative estimates will appear.

Loukas Grafakos (University of Missouri at Columbia)

Title: *An alternative to Plancherel's criterion for bilinear operators*

Abstract: A well known criterion, based on Placherel's identity, says that a convolution operator

$$L_m(f)(x) = (f * K)(x) = \int_{\mathbb{R}^n} \widehat{f}(\xi)\widehat{K}(\xi)e^{2\pi i x\cdot\xi}\, d\xi$$

is bounded from $L^2(\mathbb{R}^n)$ to itself if and only if the corresponding multiplier $\widehat{K}$, i.e. the Fourier transform of the kernel K, is an L^∞ function. We obtain a similar characterization for bilinear translation-invariant operators of the form

$$T_m(f,g)(x) = \int_{\mathbb{R}^n}\int_{\mathbb{R}^n} \widehat{f}(\xi)\widehat{g}(\eta)m(\xi,\eta)e^{2\pi i x\cdot(\xi+\eta)}\, d\xi\, d\eta$$

that are bounded from $L^2(\mathbb{R}^n) \times L^2(\mathbb{R}^n)$ to $L^1(\mathbb{R}^n)$. Our study encompasses only smooth multipliers m with bounded derivatives and the characterization we obtain is expressed in terms of the Lebesgue integrability of the multiplier. This is joint work with Danqing He and Lenka Slavíková.

Philip T. Gressman (University of Pennsylvania)

Title: *Geometric Measures and Radon-like Operators*

Abstract: In this talk we will discuss a family of functionals on measurable sets which arise in the study of certain intermediate-dimensional Radon-like operators. These objects lead to a natural generalization of Hausdorff measure which includes both the classical case as well as D. Oberlin's affine Hausdorff measure. On algebraic submanifolds of Euclidean space, the relationship between these new measures and the Lebesgue measure can be fully understood both quantitatively (giving a formula for the Radon-Nykodym derivative) and qualitatively (with a characterization in terms of Newton polytopes).

Yongsheng Han (Auburn University)

Title: *Characterizations of flag Hardy space via Riesz transforms, maximal functions and Littlewood-Paley theory*

Abstract: The flag singular integral theory was began with the fundamental work of Muller-Ricci-Stein on the L^p, $1 < p < \infty$, boundedness of Marcinkiewicz multipliers on the Heisenberg group. This is surprising since these multipliers are invariant under a two parameter group of dilations on $\mathbb{C}^n \times \mathbb{R}$, while there is no two parameter group of automorphic dilations on $\mathbb{H}^n$. Moreover, they show that Marcinkiewicz multiplier can be characterized by the convolution operator of the form $f * K$ where, however, K is a flag convolution kernel. Nagel, Ricci and Stein studied flag singular integrals on the Euclidean space and gave applications on certain quadratic CR submanifolds of $\mathbb{C}^n$. More recently, Nagel, Ricci, Stein and Wainger further generalized the theory of singular integrals with flag kernels to a more general setting, namely, homogeneous group. In this talk, we describe the joint work with Ming-Yi Lee, Ji Li and Brett D. Wick that how the flag Hardy space $H^1_F(\mathbb{R}^n \times \mathbb{R}^m)$ can be characterized via maximal functions, the Littlewood-Paley square function, Lusin area integrals and the Riesz transforms. The crucial tools for these characterizations include establishing an appropriate discrete Calderón reproducing formulae, a version of the Placherel-Pólya inequalities for flag quadratic forms, certain Poisson maximal functions and Riesz transforms in the flag setting.

Guixiang Hong (Wuhan University)

Title: *Product estimates in function spaces on quantum tori and quantum Euclidean spaces*

Abstract: The theory of function spaces, including the equivalent characterizations, the embedding properties, the product estimates etc, play important role in PDEs and geometric analysis. Recently, in the noncommutative setting, on one hand, Xu-Xiong-Yin introduced Besov spaces and Sobolev spaces on quantum tori, providing several equivalent characterizations and studied some embedding properties; on the other hand, Gonzalez-Junge-Parcet introduced singular integral operators and pseudo-differential operators on quantum Euclidean spaces, studied the mapping properties and found some applications to noncommutative PDEs. Product estimates are inevitable in dealing with nonlinear PDEs and harmonic mappings. However, in the noncommutative setting, the product estimates are a priori unavailable because of the failure of paraproduct estimates due to experts including Pisier, Volberg, Petermichl, Nazarov, Mei etc. Recently, I show that with some additional regularity on the functions, the product estimates survive in the noncommutative setting. Then together with some new observations on noncommutative function spaces such as some new embedding properties, I am able to show some product estimates in function spaces on quantum tori and quantum Euclidean spaces, which are fundamental examples in quantum field theory and noncommutative geometry.

Yi Hu (Georgia Southern University)

Title: *Some results on nonlinear Schrödinger equations with rotation*

Abstract: In this talk we consider nonlinear Schrödinger equation (NLS) with a harmonic potential and a rotation term. In the focusing and mass-critical nonlinearity case, we show that the mass of the ground state for the free NLS is the sharp threshold for finite time blowup. We also show that under a suitable spectral condition, there holds the "log-log law" when the mass of the initial data is slightly above that of the ground state. We construct minimal mass blowup solutions near the ground state level with distinct blowup rates. This work is joint with Nyla Basharat, Hichem Hajaiej and Shijun Zheng.

Renjin Jiang (Tianjin University)

Title: *On Riesz transform and regularity of heat kernel and harmonic function*

Abstract: In this talk, I will report some recent study on the Riesz transform and regularity of heat kernel and harmonic function. From Strichartz 1983 and Bakry 1987, it has been a longstanding question whether the boundedness of the Riesz transform on non-compact manifolds can be characterized. Many partial answers have been provided since then. A remarkable result due to Auscher-Coulhon-Duong-Hofmann 2004 states that, under a doubling condition and a scale-invariant Poincare inequality,

boundedness of the Riesz transform is equivalent to corresponding heat kernel regularity. We report in this talk some progressby relaxing the requirements of the Poincare inequality, and behaviors of the Riesz transform under gluing operation and perturbations.

Pekka Koskela (University of Jyväskylä)

Title: *Controlled diffeomorphic extension of homeomorphisms*

Abstract: Given a self-homeomorphism of the unit circle, the Poisson extension gives a harmonic diffeomorphism of the unit disk with p-integrable derivatives for all p strictly less than 2. This was shown by Verchota in 2007. Later sharp estimates and conditions for the extension to have 2-integrable derivatives were given by Astala, Iwaniec, Martin, Onninen and Sbordone. We give generalizations of these results and also analogous results for homeomorphisms of the unit circle onto an inner chord-arc curve. When the interior of this curve fails to be convex, our extension is not harmonic. This is joint work with my students Zhuang Wang and Haiqing Xu.

Sanghyuk Lee (Seoul National University)

Title: *Strichartz estimates for orthonormal systems*

Abstract: This talk concerns the Strichartz estimates for the Schrödinger equation with orthonormal system of initial data. The estimates can be thought of a vector valued generalization of the classical estimates. We discuss the optimal range of these estimates and connection to the Strichartz estimates for the kinetic transport equation.

Hong-Quan Li (Fudan University)

Title: *Revisiting the heat kernel on isotropic and nonisotropic Heisenberg groups*

Abstract: We obtain the precise bounds for the heat kernel on isotropic Heisenberg groups by using well-known results on the three dimensional case. Also, we study the asymptotic estimates at infinity for the heat kernel on nonisotropic Heisenberg groups. As a consequence, we give uniform upper and lower estimates of the heat kernel, and complete its short-time behavior obtained by Beals-Gaveau-Greiner.

Guozhen Lu (University of Connecticut)

Title: *Endpoint estimates for single and multi-parameter singular Radon transforms*

Abstract: Christ, Nagel, Stein and Wainger and Stein and Street established the L^p boundedness of single and multi-parameter singular radon transforms in one and multi-parameter settings respectively. We will prove the endpoint estimates of such singular radon transforms in both settings.

Changxing Miao (Institute of Applied Physics and Computational Mathematics)

Title: *The energy-critical nonlinear Schrödinger equation with inverse-square potential*

Abstract: In this talk, I shall discuss the global well-posedness and scattering theory of the defocusing energy-critical nonlinear Schrödinger equation with inverse-square potential by making use of profiles decomposition, concentration-compactness arguments, and some harmonic analysis tools related to the Hardy operator.

This talk bases on the joint works with Killip,Visan, Zhang and Zheng.

Detlef Müller (Christian-Albrechts-Universität zu Kiel)

Title: *On Fourier restriction for non-quadratic hyperbolic surfaces*

Abstract: In contrast to what is known about Fourier restriction for elliptic surfaces, Fourier restriction to hyperbolic surfaces is still poorly understood. Until very recently, basically only the quadric $z = xy$ had been studied successfully. In my talk, after giving some background on Fourier restriction, I shall report on joint work with S. Buschenhenke and A. Vargas on perturbations of this quadric. Our analysis, making use of the bilinear method, reveals that the geometry of the problem changes drastically in the presence of a perturbation term, and that new techniques, compared to the elliptic case, are required to handle more general hyperbolic surfaces.

Camil Muscalu (Cornell University)

Title: *The Helicoidal Method*

Abstract: The goal of the lecture is to describe some of our recent work with Cristina Benea, on what we called the *helicoidal method*. One possible way to think of this new, iterative, method, is to view it as a modern and more powerful analogue of Rubio de Francia extrapolation theory. Just as the technique of Rubio de Francia allows one to obtain weighted norm inequalities for the operator in question and its multiple vector valued extensions, so does the helicoidal method allow one to prove sparse domination for the corresponding operator and its multiple vector valued extensions. Using these ideas, in the last few years, we have been able to give complete, positive answers, to a number of natural open questions, that have been circulating for some time.

It is also interesting to mention that the *fundamental localized estimates* that lie at the hart of the method, have nontrivial consequences even in the scalar setting. When applied to the case of the bilinear Hilbert transform, for instance, they imply the known L^p estimates form the Lacey & Thiele theorem directly, without the use of interpolation of trilinear forms, while when applied to the case of the variational Carleson operator, they provide a significant simplification of the proof of Oberlin et al. theorem.

Eiichi Nakai (Ibaraki University)

Title: *Commutators of integral operators with functions in generalized Campanato spaces with variable growth condition*

Abstract: Let $\mathbb{R}^n$ be the n-dimensional Euclidean space. Let $b \in \mathrm{BMO}(\mathbb{R}^n)$ and T be a Calderón-Zygmund singular integral operator. In 1976 Coifman, Rochberg and Weiss [2] proved that the commutator $[b,T] = bT - Tb$ is bounded on $L^p(\mathbb{R}^n)$ $(1 < p < \infty)$, that is,

$$\|[b,T]f\|_{L^p} = \|bTf - T(bf)\|_{L^p} \le C\|b\|_{\mathrm{BMO}}\|f\|_{L^p},$$

where C is a positive constant independent of b and f. For the fractional integral operator I_α, Chanillo [1] proved the boundedness of $[b, I_\alpha]$ in 1982. That is,

$$\|[b, I_\alpha]f\|_{L^q} \le C\|b\|_{\mathrm{BMO}}\|f\|_{L^p},$$

where $\alpha \in (0,n)$, $p, q \in (1,\infty)$ and $-n/p + \alpha = -n/q$. These results were extended to Morrey spaces by Di Fazio and Ragusa [3] in 1991.

In this talk we discuss the boundedness of the commutators $[b,T]$ and $[b, I_\rho]$ on generalized Morrey spaces with variable growth condition, where T is a Calderón-Zygmund operator, I_ρ is a generalized fractional integral operator and b is a function in generalized Campanato spaces with variable growth condition.

This talk is based on a joint work with Ryutaro Arai (Ibaraki University).

References.

[1] S. Chanillo, A note on commutators, Indiana Univ. Math. J. 31 (1982), no. 1, 7–16.

[2] R. R. Coifman, R. Rochberg and G. Weiss, Factorization theorems for Hardy spaces in several variables, Ann. of Math. (2) 103 (1976), no. 3, 611–635.

[3] G. Di Fazio and M. A. Ragusa, Commutators and Morrey spaces. Boll. Un. Mat. Ital. A (7) 5 (1991), no. 3, 323–332.

Carlos Pérez (University of the Basque Country and BCAM- Basque Center for Applied Mathematics)

Title: *A revised version of the Harboure-Macias-Segovia extrapolation theorem*

Abstract: The extrapolation theorem of Rubio de Francia is one of the most beautiful and useful theorems in modern Harmonic Analysis. In 1988, Harboure-Macias-Segovia gave another version of this theorem using as part of the initial extrapolation hypothesis the weighted space of B.M.O. introduced independently by Garcia-Cuerva and Muckenhoupt-Wheeden in the 70's. We plan to revisit this theorem by discussing a different proof based on modern technology which provides a good control on the relevant constants. This is a joint work with A. Criado and I. Rivera-Rios.

Tao Qian (Univrsity of Macau)

Title: *Pre-Orthogonal Adaptive Fourier Decompositions in Reproducing Kernel Hilbert Spaces and Applications*

Abstract: In a reproducing kernel Hilbert space with boundary vanishing condition (Riemann-Lebegue Lemma of RKHS) one can perform pre-orthogonal adaptive Fourier decomposition (POAFD) that gives rise to fast converging (sparse) decomposition of signals in the Hilbert space or approximations by linear combinations of the parameterized reproducing kernels. Its formulation makes it to be the most efficient matching pursuit method. It has great potential to be used in various mathematical and engineering problems. We will in particular mention approximations to solutions of pde's based on this method.

Tapio Rajala (University of Jyväskylä)

Title: *On density of Sobolev functions on Euclidean domains*

Abstract: I will present recent results on the density of the Sobolev space $W^{k,q}(\Omega)$ in $W^{k,p}(\Omega)$, when $1 \leq p < q \leq \infty$ for domains Ω in the Euclidean space. I will also briefly discuss removability of sets of measure zero for Sobolev functions and extension operators from $w^{1,p}(\Omega)$ to $W^{1,p}(\mathbb{R}^n)$ when $1 \leq p \leq \infty$. The talk is based on joint works with P. Koskela, D. Nandi, T. Schultz and Y. Zhang.

Gaku Sadasue (Osaka Kyoiku University)

Title: *Analysis on martingale Morrey spaces*

Abstract: In martingale theory, various analogies between function spaces and martingale spaces have been studied. In recent years, the notion of Morrey spaces was introduced in martingale theory.

In this talk, we review some these studies and give a new result concerning analysis on martingale Morrey spaces.

Eero Saksman (University of Helsinki)

Title: *On the regularity of solutions of Beltrami equations is domains*

Abstract: The regularity of solutions of the Beltrami equation $\overline{\partial f} = \mu \partial f$ has gained new interest during last years, including contributions by e.g. Clop, Faraco, Mateu, Orobitg, Ruiz, Tolsa, Verdera,... In this talk we describe some new results in this direction with special emphasis on regularity in the Triebel-Lizorkin scale and for non-principal quasi-conformal maps. The talk is based on joint work with Kari Astala (Aalto University) and Marti Prats (Universitat Autonoma Barcelona).

Shuichi Sato (Kanazawa University)

Title: *Littlewood-Paley function characterization of Hardy spaces on homogeneous groups*

Abstract: I would like to talk about a characterization of the Hardy spaces on the homogeneous groups by certain Littlewood-Paley functions. It generalizes known results on the Euclidean spaces and on the stratified groups with Littlewood-Paley functions arising from heat kernels.

Yoshihiro Sawano (Tokyo Metropolitan University)

Title: *Complex interpolation and Calderó n–Mityagin couples of Morrey spaces*

Abstract: We study interpolation spaces between global Morrey spaces and between local Morrey spaces. We prove that for a wide class of couples of these spaces the upper complex (Calderón) spaces are not described by the K-method of interpolation. A by-product of our results is that couples of Morrey spaces belonging to this class are not Calderón–Mityagin couples. A couple is said to have the universal K-property if all relative interpolation spaces from any Banach couple to the fixed couple are relatively K-monotone. A couple of local Morrey spaces is proved to have the universal K-property once it is a Calderón–Mityagin couple. This talk is based on a joint work with Mieczysław Mastyło (Adam Mickiewicz University).

Shuanglin Shao (University of Kansas)

Title: *On characterization of the sharp Strichartz inequality for the Schrödinger equation*

Abstract: In this talk, we discuss the extremal problem for the Strichartz inequality for the Schrodinger equation on $\mathbb{R}^3$. We provide a new proof to the characterization of the extremal functions. The only extremal functions are Gaussian functions up to the natural symmetries of the Strichartz inequality, which was investigated previously by Foschi and Hundertmark-Zharnitsky. This is a joint work with Jin-Cheng Jiang.

Zhongwei Shen (University of Kentucky)

Title: *Boundary Layers and Higher-Order Convergence in Periodic Homogenization*

Abstract: This talk is concerned with a family of second-order elliptic operators in divergence form with periodic coefficients, arising in the theory of homogenization. I will discuss recent progress on boundary value problems with highly oscillating boundary data. The study is motivated by the problem of higher order convergence. The use of techniques from harmonic analysis will be highlighted. This is a joint work with Jinping Zhuge.

Winfried Sickel (Friedrich-Schiller-University Jena)

Title: *Pointwise Multipliers for Besov Spaces*

Abstract: We plan to give a survey on results about pointwise multipliers of Besov spaces. In particular we will describe the set of all pointwise multipliers of Besov spaces under the restrictions $0 < p, q \leq \infty$ and $s > d/p$. In a second part we will discuss the smoothness of characteristic functions of open sets and afterwards, under which conditions such a characteristic function will be a pointwise multiplier for a Besov space.

This is joined work with Kien van Nguyen (INS Bonn).

Liang Song (Sun Yat-sen University)

Title: *Maximal function characterizations for Hardy spaces associated to nonnegative selfadjoint operators*

Abstract: Let X be a metric measure space with a doubling measure and L be a nonnegative self-adjoint operator acting on $L^2(X)$. Assume that L generates an analytic semigroup e^{-tL} whose kernels $p_t(x, y)$ satisfy Gaussian upper bounds but without any assumptions on the regularity of space variables x and y. In this talk we give an atomic decomposition for the Hardy spaces $H^p_{L,max}(X)$ in terms of the nontangential maximal function associated with the heat semigroup of L, and hence we establish characterizations of Hardy spaces associated to an operator L, via an atomic decomposition

or the nontangential maximal function. We also obtain an equivalence of $H^p_{L,max}(X)$ in terms of the radial maximal function. This is a joint work with Prof. Lixin Yan.

Qiyu Sun (University of Central Florida)

Title: *Determination of real-valued functions from their magnitudes terated and Mixed Weak*

Abstract: A real-valued function is defined by its evaluation on its domain. In this talk, we discuss the problem whether a function can be determined by its magnitudes on its domain or a subset of its domain. The above problem is related to phase retrievable and it is called a phaseless sampling and reconstruction in signal processing. In this talk, we will discuss mathematical foundation and numerical implementation to determine a function residing in a shift-invariant space from their magnitudes.

Wenchang Sun (Nankai University)

Title: *Iterated and Mixed Weak Norms with Applications to Geometric Inequalities*

Abstract: We consider a new weak norm, iterated weak norm in Lebesgue spaces with mixed norms. We study properties of the mixed weak norm and the iterated weak norm and present the relationship between the two weak norms. Even for the ordinary Lebesgue spaces, the two weak norms are not equivalent and any one of them can not control the other one. We give some convergence and completeness results for the two weak norms respectively. We study the convergence in truncated norm, which is a substitution of the convergence in measure for mixed Lebesgue spaces. And we give a characterization of the convergence in truncated norm. We show that Hölder's inequality is not always true on mixed weak spaces and we give a complete characterization of indices which admit Hölder's inequality. As applications, we establish some geometric inequalities related to fractional integrals in mixed weak spaces and in iterated weak spaces respectively, which essentially generalize the Hardy-Littlewood-Sobolev inequality.

Yutaka Terasawa (Nagoya University)

Title: *Weak solutions for a diffuse interface model for two-phase flows of incompressible fluids with different densities and nonlocal free energies*

Abstract: We prove existence of weak solutions for a diffuse interface model for the flow of two viscous incompressible Newtonian fluids with different densities in a bounded domain in two and three space dimensions. In contrast to previous works, we study a model with a singular non-local free energy, which controls the fractional Sobolev norm of the volume fraction. We show existence of weak

solutions for large times with the aid of an implicit time discretization. This talk is based on a joint work with Helmut Abels (Regensburg).

Naohito Tomita (Osaka University)

Title: *Bilinear pseudo-differential operators with exotic symbols*

Abstract: In this talk, the boundedness of bilinear pseudo-differential operators with symbols in the exotic class $BS^m_{\rho,\rho}$, $0 \le \rho < 1$, from products of Hardy spaces $H^p \times H^q$ to L^r, $1/p + 1/q = 1/r$, is discussed in the full range $0 < p, q, r \le \infty$. Our aim is to determine the critical order $m = m(\rho, p, q)$ to assure the boundedness. This is a joint work with Professor Akihiko Miyachi (Tokyo Woman's Christian University).

Rodolfo H. Torres (University of Kansas)

Title: *Characterization of Compactness of Commutators of Bilinear Singular Integral Operators*

Abstract: The commutators of bilinear Calderón-Zygmund operators and pointwise multiplication with a symbol in CMO are bilinear compact operators on product of Lebesgue spaces. This work shows that, for certain non-degenerate Calderón-Zygmund operators, the symbol being in CMO is not only sufficient but actually necessary for the compactness of the commutators. This is joint work with Lucas Chaffee, Peng Chen, Yanchang Han, and Lesley A. Ward.

Quanhua Xu (Harbin Institute of Technology & Université de Franche-Comté)

Title: *Analysis on quantum tori*

Abstract: Quantum tori are fundamental examples in operator algebras and noncommutative geometry. Their algebraic and geometric aspects have been well understood. However, the study on their analytic aspect has emerged only recently. This talk will give a survey of the recent development on analysis on quantum tori. We will present two families of results: the first one on the convergence of Fourier series, and the second on the embedding and characterizations of Sobolev and Besov spaces. The talk is based on joint works with Zeqian Chen, Runlian Xia, Xiao Xiong and Zhi Yin.

Lixin Yan (Sun Yat-sen University)

Title: *Some results on Bochner-Riesz means for elliptic operators*

Abstract: In this talk we investigate L^p bounds for the Bochner-Riesz means and the maximal Bochner-Riesz operators for self-adjoint operators of elliptic type. In particular, we apply it to the Hermite oscillator $H = -\Delta + |x|^2$ in R^n and for other related operators, improving earlier results of Thangavelu and of Karadzhov.

Ping Zhang (The Chinese Academy of Sciences)

Title: *On the critical one component regularity for 3-D Navier-Stokes system*

Abstract: Given an initial data v_0 with vorticity $\Omega_0 = \nabla \times v_0$ in $L^{\frac{3}{2}}$, (which implies that v_0 belongs to the Sobolev space $H^{\frac{1}{2}}$), we prove that the solution v given by the classical Fujita-Kato theorem blows up in a finite time $T^\star$ only if, for any p in $]4, 6[$ and any unit vector e in $\mathbb{R}^3$, there holds $\int_0^{T^\star} \|v(t)\cdot e\|^p_{\dot{H}^{\frac{1}{2}+\frac{2}{p}}}\, dt = \infty$. We remark that all these quantities are scaling invariant under the scaling transformation of Navier-Stokes system.

Zhifei Zhang (Peking University)

Title: *Linear inviscid damping for shear flows*

Abstract: Landau damping can be defined as damping of a collective mode of oscillations in a collisionless plasma. Analogues of Landau damping has been observed in the sheared hydrodynamic flows. In this talk, I will report our recent results on the damping of the linearized 2-D Euler equations around shear flows including monotone flows and non-monotone flows.

Yuan Zhou (Beihang University)

Title: *A sharp Sobolev regulairty for infinity harmonic functions in plane*

Abstract: For any $\alpha > 0$ we show that $|Du|^\alpha \in W^{1,2}_{\text{loc}}$ for any infinity harmonic function u in plannar domains, which is sharp when $\alpha \to 0$. We also show that the distroibitional determinant $-\det D^2 u$ is a Radon measure. Quantative estimates are also given.

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中国科学院大学 雁栖湖校园平面图
University of Chinese Academy of Sciences Yanqi Lake Campus Map
N
西区
West Campus
西区
主入口
东区
East Campus
怀北火车站
雁栖湖
Yanqi Lake