The 11th East Asian conference in Harmonic Analysis and Applications

Date: August 15 (Thur.) - 19 (Mon.), 2024
Place: 5th floor of International Science Innovation Building (No. 69), Kyoto University Access

– – –Abstracts of the talks on 19th – – –

Plenary talks: 50 min.

- Toru Nogayama, (Tokyo University of Science),
  Date: 19th 10:00 - 10:50.
  - Title: *Weighted maximal inequalities for local Bourgain–Morrey spaces.*
  - Abstract: In this talk, we consider the boundedness of the Hardy–Littlewood maximal operator on weighted local Bourgain–Morrey spaces. The function spaces which we call " Bourgain-Morrey spaces " were introduced by Bourgain. He used this space to refine the Strichartz estimate. The Bourgain–Morrey space is applied to various partial differential equations. There are some types of weighted (Bourgain-) Morrey spaces. We concentrate on the Samko type and the Komori–Shirai type. In particular, we consider the case of the power weight $|\cdot|^\beta$, ($\beta \in \mathbb{R}$) and give the range of the parameter β for which the maximal operator is bounded on each space.
- Hongquan Li, (Fudan University),
  Date: 19th 16:10 - 17:00.
  - Title: *Centered Hardy-Littlewood Maximal Functions on H-Type Groups Revisited.*
  - Abstract: Using the method of stationary phase, we obtain the uniform asymptotic behavior of the Poisson kernel, associated to the canonical sub-Laplacian as well as the full Laplacian, on Heisenberg-type groups $\mathbb{H}(2n, m)$. We prove that there exists a constant $C > 0$, independent of (n, m), such that $\|M_K\|_{L^1 \to L^{1,\infty}} \leq C\, n$, where M_K denotes the centered Hardy-Littlewood maximal operator defined by the Korányi norm. While for $M = M_{CC}$ or M_R, the corresponding operator related to the canonical sub-Riemannian and Riemannian distance respectively, we obtain $\|M\|_{L^1 \to L^{1,\infty}} \leq C\,(3/2)^{\frac{m}{2}}\, n$. In particular, we provide an affirmative answer to the question left open in Li-Qian TAMS 14' by means of a much simpler method. Besides, these bounds are perfectly matched with the associated Green function. Furthermore, the $(3/2)^{\frac{m}{2}}\, n$ order bound remains uniformly valid, whenever the canonical Sub-Riemannian or Riemannian distance are replaced by a large class of Carnot-Carathéodory distances. This a work with Cheng Bi and Ye Zhang.

Talks: 30 min.

- Taiki Takeuchi, (Kyoto University),
  Date: 19th 11:10 - 11:40.
  - Title: *The Lorentz-Chemin-Lerner space and its characterizations.*
  - Abstract: In this talk we define the Lorentz-Chemin-Lerner spaces, where the classical Chemin-Lerner spaces were initially introduced by Chemin and Lerner (1995) to analyze the Navier-Stokes system. We first summarize our motivation from the space-time estimates for the heat semigroup shown by Kozono and Shimizu (2019), and then we compare them with the corresponding estimates in the Lorentz-Chemin-Lerner spaces. As our main results of this talk, we show that the Lorentz-Chemin-Lerner spaces may be characterized as the real interpolation spaces of the classical Chemin-Lerner spaces.
- Jinsol Seo, (KIAS),
  Date: 19th 11:10 - 11:40.
  - Title: *L^p theory for the Poisson equation in non-smooth domains.*
  - Abstract: The Poisson equation ($\Delta u = f$) is one of the most fundamental and classical PDEs, and its L^p theory is important for the regularity of solutions. In this presentation, we introduce a general L^p unique solvability result for the Poisson equation in non-smooth domains, together with its applications based on a relation between the Hardy inequality, superharmonic functions, and various domain conditions. We consider the local harmonic measure decay condition, the exterior cone condition, convex domains, the exterior Reifenberg condition, and domains whose Aikawa codimensions are larger than 2.

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- Sewook Oh, (KIAS),
  Date: 19th 12:00 - 12:30.
  - Title: *Semiclassical L^p quasimode restriction estimates in two dimensions.*
  - Abstract: For measuring possible concentrations of the eigenfunctions of the Laplace operator on a manifold, Burq-Gerard-Tzvetkov studied L^p norm of the restrictions of the eigenfunctions to submanifolds. They proved sharp L^p estimates restricted to the geodesic or a curve having nonvanishing geodesic curvature. Later, Tacy and Hassel-Tacy generalized their results to a semiclassical setting. In this talk, I will talk about sharp L^p quasimode estimates restricted to a curve which is not geodesic and has vanishing geodesic curvature. We observe that L^p quasimode estimates restricted to a curve is determined by the contact order of curve and the geodesics.
- Xiaohua Yao, (Central China Normal University),
  Date: 19th 12:00 - 12:30.
  - Title: *L^p estimates related to Scattering theory.*
  - Abstract: In this talk, I firstly review classical scattering theory for Schrödinger operator $-\Delta + V$, including limiting absorption principle, the existence and asymptotic complete of wave operators in the context of L^2. Such the theory also works well for higher order Schrödinger operator $P(D) + V$, including particularly polyharmonic operator $(-\Delta)^m$, with $m \geq 2$. Secondly, we will report some recent works

on L^p estimates of higher order wave operators generated by $(-\Delta)^m + V$. These are joint-works with Haruya Mizutani and Zijun Wan.

– – –Lunch break – ––

- Jeongtae Oh, (Yonsei University),
  Date: 19th 14:30 - 15:00.
  - Title: *Some remarks on spherical maximal operator on Heisenberg group.*
  - Abstract: In this talk, we start by discussing the maximal operators associated to dilates of codimension two spheres in the Heisenberg group, as introduced by Nevo and Thangavelu. We present several historical results related to the operator. Additionally, we introduce the Lacunary Elliptic Maximal Operator on the Heisenberg group and explain the motivation of this work. This is joint work with Joonil Kim.
- Hiroki Ohyama, (Kyoto University),
  Date: 19th 14:30 - 15:00.
  - Title: *Fast rotation limit for the magnetohydrodynamics equations in a 3D layer.*
  - Abstract: We consider the initial value problem for the incompressible magnetohydrodynamics system with the Coriolis force in a three-dimensional infinite layer. We prove the unique existence of global solutions for initial data in the scaling invariant space when the speed of rotation is sufficiently high. Moreover, we show that its global solution converges to that of the coupled system of the 2D incompressible magnetohydrodynamics equations and the 3D induction equations as the rotation speed tends to infinity. This is based on a joint work with Keiji Yoneda.

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- Jungang Li, (University of Science and Technology of China),
  Date: 19th 15:20 - 15:50.
  - Title: *Sobolev type and Moser type inequalities on hyperbolic spaces and applications.*
  - Abstract: The hyperbolic space is one of the most important space forms other than the Euclidean spaces. Sharp geometric inequalities, together with related PDE problems on hyperbolic spaces, used to be studied in a more Euclidean manner. With the help of Helgason-Fourier analysis, a direct approach was initiated by Lu and Yang in their work about Hardy-Sobolev-Maz'ya inequalities. In this talk, I will first report some recent progress on sharp geometric inequalities on hyperbolic spaces. As applications, I will introduce how these results help to the study of some nonlinear PDEs', including the existence and classification of solutions.
- Yehyun Kwon, (Changwon National University),
  Date: 19th 15:20 - 15:50. (This is an **Online** talk.)
  - Title: *Estimates for spherical harmonic projection and unique continuation for the Schrödinger operators.*
  - Abstract: In this talk, we obtain sharp L^p-L^q estimates for the difference between spherical harmonic projection and deduce strong unique continuation properties for the fourth order Schrödinger operators with critical singular potentials.