Seminar on Functional Analysis and Global Analysis

Organized by Kenro Furutani and Takao Kobayashi

21 ∼ 22/November 2012 @Noda Campus
Seminar room on the third floor, Building 4
Tokyo University of Science
2641 Yamazaki, Noda, Chiba, Japan
Tel:+81-(0)4-7122-9250,+81-(0)4-7122-9319

Featured Topics:
• **Sub-Riemannian geometries and spectral analysis of related operators**
• **PDOs and symmetries**

Program

21 (Wednesday) November

13:25 - 13:30 Opening

13:30 - 14:20 Chisato Iwasaki (University of Hyogo)
   • Green Kernel for a Grushin type Operator

14:40 - 15:30 Irina Markina (University of Bergen)
   • ON CAUCHY-SZEGÖ KERNEL FOR QUATERNIONIC SIEGEL UPPER HALF SPACE

15:40 - 16:30 Mitsuji Tamura (Tokyo University of Science)
   • Remarks on UCP and SUCP for elastic operators (isotoropic and anisotropic case)

<—— 17:30 ∼ Banquet at Nagareyam-Ootakanomori station area ——>

22 (Thursday) November

10:10 - 11:00 Wolfram Bauer (Göttingen University)
  • On the structure of a class of commutative Banach algebras generated by Toeplitz operators on the unit ball

11:10 - 12:00 Kunio Yoshino (Tokyo city University)
  • Analytic properties of eigenvalues of Daubechies operators and Hyperfunctions

————————— Lunch —————————

13:30 - 14:20 Shigeo Takenaka (Okayama University of Science)
  • Modefications of Trapezoidal rule

14:40 - 15:30 Thoru Morimoto (Nara Women's University & Doshisha University)
  • A Klein Cartan programme for differential equations

15:40 - 16:30 Tomoyuki Kakehi (University of Okayama)
  • On the support of the fundamental solution to the Schroedinger equation on certain compact symmetric spaces

Abstract

- Irina Markina(University of Bergen)

Title : ON CAUCHY-SZEGÖ KERNEL FOR QUATERNIONIC SIEGEL UPPER HALF SPACE

Abstract : In the talk we introduce a quaternionic analogue of the Heisenberg group and explain the relation between this group and the quaternionic analogous of the Siegel upper half space. We discuss regular functions, that are counterpart of complex holomorphic functions for quaternionic setting. The Hardy space is the space of regular functions in the Siegel upper half space with L^2 boundary values. We construct the Cauchy-Szegö kernel for the Cauchy-Szegö projection integral operator from the space of L^2-integrable functions defined on the boundary of the quaternionic Siegel upper half space to the space of boundary values of the quaternionic regular functions of the Hardy space over the quaternionic Siegel upper half space. We also present the fundamental solution for a hypoelliptic operator related to the boundary of the Siegel upper half space.

- Mitsuji Tamura

Title : Remarks on UCP and SUCP for elastic operators (isotropic case and anisotropic case).

Abstract : In this talk, I consider unique continuation property (UCP) and strong unique continuation property (SUCP) for some anisotropic elastic operator. Our problem is the regularity of Lamé parameters with which the UCP holds. In the isotropic case, this problem is considered by Lin-Nakamura-Wang (2010). In this talk we review their results and extend the results to some anisotropic elastic operator which is called the elastic operator with residual tensor. Moreover we also discuss the results of SUCP for this elastic operators

- Wolfram Bauer (Georg-August-Universität Göttingen)
  wbauer@uni-math.gwdg.de

Title : On the structure of a class of commutative Banach algebras generated by Toeplitz operators on the unit ball

Abstract. First we explain a classification of commutative Banach algebras generated by Toeplitz operators and acting on the family of standard weighted Bergman spaces over the complex n-dimensional Euclidean unit ball $\mathbb{B}^n \subset \mathbb{C}^n$. These algebras are not $*$-invariant and each of them is subordinate to a maximal abelian subgroup of the automorphism group $\mathrm{Aut}(\mathbb{B}^n)$. Then we describe the Gelfand theory of the algebras corresponding to the so called quasi-elliptic group of automorphisms. We start with the simplest case where $n = 2$ and (up to isomorphisms) only one algebra of the above type exists. We describe the maximal ideals, the Gelfand map and the radical (the algebra is not semi-simple). We explain some applications to the spectral theory of operators and we prove the spectral invariance of the Banach algebras inside the full algebra of all bounded operators. Various new effects arise for $n > 2$ and they cause difficulties in our analysis. We explain some recent results in the general setting. This is joint work with N. Vasilevski (CINVESTAV, Mexico).

REFERENCES

[1] W. Bauer, N. Vasilevski, *On the structure of a commutative Banach algebra generated by Toeplitz operators with quasi-homogeneous symbols*, Integr. Equ. Oper. Theory 74 (2012), 199-231.

- **Kunio Yoshino (Tokyo city University)**

Title : **Analytic properties of eigenvalues of Daubechies operators and Hyperfunctions**

Abstract : We consider analytic properties of eigenvalues of Daubechies operators. Especially we will clarify the relationship between analytic continuation of eigenvalues and the generating function of eigenvalues by using the theory of Fourier ultra - hyperfunctions. Moreover we will construct local operator (Sato's hyperfunctions with support at the origin) by eigenvalues of Daubechies Operators. This construction is related to a Ramanujan's identity(q - analogue).

- **Shigeo Takenaka**

Title : **Modefications of Trapezoidal rule**
Abstract : See another sheet

- **Thoru Morimoto (Nara Wemen's University $\&$ Doshisha University)**

Title : **A Klein Cartan programme for differential equations**

Abstract : In 1872 Klein delared the Erlangen programme to understand various geometries in a unified manner as homogeous spaces of groups, then in 1920's Cartan invented the notion of espace généralisé (principal bundle with Cartan connection in modern terminology) to treat still group theoretically not only the homogeous spaces but also inhomogeous spaces such as Riemannian geometries, conformal or projective differential geometries.

We propose a Klein Cartan programme for differential equations in the framework of nilpotent geometry and analysis, which gives rise to a variety of interesting problems between the geometries and the differential equations.

● Tomoyuki Kakehi (Okayama University)

Title : On the support of the fundamental solution to the Schroedinger equation on certain compact symmetric spaces

Abstract : In this talk, I will consider the Cauchy problem for the Schroedinger equation corresponding to a free particle on a certain compact symmetric space. Briefly speaking, the main result in this talk is that at a rational time the support of the fundamental solution becomes a lower dimensional subset whereas at an irrational time its support becomes the whole symmetric space. I will also deal with magnetic Schroedinger equations on compact symmetric spaces.