Abstracts

Plenary Lectures

**Fornaess John Erik:** Holomorphic mappings

Abstract: Holomorphic mappings are basic to Several Complex Variables. I will discuss some aspects of this topic.

**Kim Kang-Tae:** Riemann Mapping Theorem by Riemann's viewpoint

Abstract: Riemann mapping theorem was only a paragraph of Riemann's lecture at Goettingen in 1851, and the proof was too sketchy (Weierstrass could not accept it!). The proof in the textbook in by C. Caratheodory, perfected in 1920s. I will present the proof organized by R. E. Greene and myself (2016) which is really following Riemann's original ways. The proof is on the level of the 1st year graduate student and so this lecture is for the general audience.

**Ohsawa Takeo:** Nishino's rigidity and questions on locally pseudoconvex maps

Abstract: Nishino proved in 1969 that locally Stein maps with fibers $\cong C$ are locally trivial. The proof will be reviewed and questions suggested by the result will be discussed. A new application of the $L^2$ extension theorem will be presented in this context.
Wong Bun: Curvature and rational curves on complex manifolds

Abstract: The study of rational curves on projective varieties is one of the major interests in complex geometry. In this talk I will give a survey on some progress about the connections between curvature and rational curves on Kahler manifolds.

Invited speakers

Dinew Slawomir: Upper contact sets for plurisubharmonic functions

Abstract: Given a plurisubharmonic function $u$ defined on a domain $\Omega \subset \mathbb{C}^n$, one says that a point $z \in \Omega$ belongs to the upper contact set for $u$ if the graph of $u$ can be touched from above at $z$ by the graph of a local $C^2$ smooth function $\phi$. Such a $\phi$ is called a local upper differential test for $u$ at $z$. Differential tests appear in the viscosity theory of the complex Monge-Ampère equation. In the talk I shall discuss basic properties of differential tests and contact sets. This is a joint work with Ž. Dinew.

Fan Xinya: Wavelets Transforms and Toeplitz Operators on Symmetric Siegel Domains

Abstract: In this talks, we take advantage of Jordan triple systems and orbits theoretic methods to research matrix coefficients, wavelets and
Toeplitz operators on symmetric Siegel domains. First of all, we use a kind of coupling inner products to get the Plancherel measure. We also describe the invariant measures on the symmetric cones via Siegel-Godement transforms. Secondly, in the viewpoint of square integrability of unitary representations, we show the irreducible decomposition of $L^2$-spaces on the Siegel-type nilpotent Lie groups, and give a concrete form of the wavelet transforms. Also, a family algebra of invariant orthogonal admissible wavelets is acquired via Hua-integral formulas, Jack polynomials, generalized Laguerre polynomials and Gelfand pairs. Furthermore, we construct a kind of symbol function and establish a criterion for the boundedness and compactness of Toeplitz operators by estimating for the parameters of Toeplitz operator on symmetric cones.

**Ha Jeongmin:** A norm equivalence and characterizations for generalized Fock spaces

Abstract: We consider generalized Fock spaces with an exponential type weight on n dimensional complex spaces. We prove that the mixed norm for an exponential type weighted integral of an entire function is equivalent to the mixed norm of its radial derivative and the distortion function from the weight function in the n-dimensional complex space. Moreover, we obtain Lipschitz type characterization and double integral characterization for some generalized Fock spaces.
Harz Tobias: On non-approximability of polynomial convex hulls by analytic varieties.

Abstract: The purpose of this talk is to present a short counterexample of the following type: Let $K \subset C^n$ be a compact set, and let
$$\hat{K} := \{ z \in C^n : |f(z)| \leq \max_K |f| \}$$
denote its polynomially convex hull. Assume that there exists a point $p \in \hat{K} \setminus K$. Then in general it is not possible to find a sequence $(A_j)$ of analytic varieties with boundary $bA_j$ such that $p \in A_j$ for every $j \in \mathbb{N}$ and $\lim_{j \to \infty} bA_j \subset K$.

Joo Seungro: On boundary points at which the squeezing function tends to one

Abstract: J.E. Fornaess posed the question whether the boundary point of smoothly bounded pseudoconvex domain is strictly pseudoconvex, if the asymptotic limit of the squeezing function is 1. The purpose of this talk is to give an affirmative answer when the domain is in $C^2$ with smooth boundary of finite type in the sense of D’Angelo.

Kikuta Shin: Degeneration of positivity for log-canonical bundle and Kähler-Einstein metric

Abstract: We would like to discuss some relations between the positivity of the log-canonical bundle and the boundary behavior of the Kähler-Einstein metric over a quasi-projective manifold. In particular, via its
volume growth, we characterize when the boundary is of general type. We will also talk about our recent progress in the case when the boundary is Calabi-Yau.

**Kusakabe Yuta:** Dense holomorphic curves in spaces of holomorphic maps

Abstract: We study when there exists a dense holomorphic curve in a space of holomorphic maps from a Stein space. Our results state that for any bounded convex domain $\Omega \subset \mathbb{C}^n$ and any connected complex manifold $Y$, the space $O(\Omega,Y)$ contains a dense holomorphic disc, and that $Y$ is an Oka manifold if and only if for any Stein space $X$ there exists a dense entire curve in every path component of $O(X,Y)$. The latter gives a new characterization of Oka manifolds. If time permits, I will give some applications of dense holomorphic curves.

**Li Xiaoshan:** Morse inequalities and Kodaira embedding theorem for CR manifolds with circle action

Abstract: Let $(X,T^{[0,0]}X)$ be a compact CR manifold and $(L,h)$ be a Hermitian CR line bundle over $X$. When $X$ is Levi-flat and $L$ is positive, Ohsawa and Sibony constructed for every $\chi \in \mathbb{N}$ a CR projective embedding of $C^\chi$-smooth of the Levi-flat CR manifold. Adachi constructed a counterexample to show that the $C^\chi$-smooth cannot
be generalized to $C^\infty$-smooth. The difficulty comes from the fact that the Kohn Laplacian is not hypoelliptic on Levi flat manifolds. In this talk, we will consider CR manifold $X$ with a transversal CR $S^1$-action and rigid (or $S^1$-invariant) CR line bundle $L$ over $X$. Without any Levi curvature assumption on $X$, by studying the partial Szeg"o kernel on $(0,q)$-forms with values in $L^1$ we will obtain the Morse inequalities on $X$. When $L$ is positive, the Kodaira embedding theorem for CR manifold with $S^1$-action is established. As a consequence, we generalize Ohsawa and Sibony's result to $C^\infty$-smooth.

**Liu Xiaojun:** Upper Bounds of GCD Counting Function for Holomorphic Maps

Abstract: In this paper, we give upper bounds for the gcd counting function (which is an analogue for the notion of gcd in the context of holomorphic maps) in various settings. As applications, we obtain analytic dependence of entire functions from the second main theorem and multiplicative dependence under the fundamental conjecture for entire curves.

**Nguyen Ngoc Cuong:** On the Hölder continuous subsolution problem for the complex Monge-Ampère equation

Abstract: We give a necessary and sufficient condition for positive Borel
measures such that the Dirichlet problem, with zero boundary data, for the complex Monge-Ampère equation admits Hölder continuous plurisubharmonic solutions. In particular, when the subsolution has finite Monge-Ampère total mass, we obtain an affirmative answer to a question of Zeriahi.

**Park Soohyun:** Two types of Characterizations for exponentially weighted Bergman spaces

Abstract: We characterize weighted Bergman spaces for certain exponential weights. In this talk, two types of characterizations in terms of Lipschitz type conditions and double integral conditions are presented. We also obtain boundedness of symmetric lifting operator by using the Lipschitz type characterizations.

**Yuan Yuan:** Diameter rigidity for Kahler manifolds with positive bisectional curvature

Abstract: I will discuss the recent work with Gang Liu on the diameter rigidity for compact Kahler manifolds with positive bisectional curvature.

**Wang Jianfei:** The Roper-Suffridge extension operator and its applications to convex mappings
Abstract: In this talk, we mainly concern the Roper-Suffridge extension operator and its applications to convex mappings. Firstly, we generalize and prove this Roper-Suffridge extension operator preserves E-starlike mapping with a new idea. As a consequence, we solve a problem of Graham and Kohr in a new method. By introducing a version of scaling method, the second part is to construct some new convex mappings on Thullen domain which can be applied to discuss the extremal point of convex mappings on this domain. This is a joint work with Prof. TaiShun Liu.

**Wang Zhiwei:** Recent Progress on Grauert-Riemenschneider type criterion

Abstract: In this talk, we introduce some recent progress on Grauert-Riemenschneider type criterion.

**Zhu Zeping:** Discrete Clifford analysis

Abstract: Clifford analysis is a function theory centred on the notion “monogenic function”, which is a higher dimensional generalization of holomorphic functions on the complex plane. In recent years, several authors showed interest in finding a proper framework for the discretization of Clifford analysis on the n-D lattices. It turns out the discretized theory shares a lot of common properties with the original
one, such as the Taylor series expansion, Cauchy-Pompeiu formula, Hardy spaces on the half spaces, etc.. To discover more similarities, we studied the boundary behavior of discrete monogenic functions. The main difficulty we encountered is the absence of the notion of the non-tangential limit on lattices. To overcome it, we introduced the two layered structure of discrete boundaries. On the two layered structures, we managed to establish an integral theory by means of the discrete boundary measure and the discrete outward normal vector. With these new notations, several theorems in Clifford analysis was generalized to the discrete versions. Among other contributions, the discrete Sokhotski-Plemelj formula has been established over an arbitrary bounded boundary. This allows us to give a criterion for the solvability of the Dirichlet problem for the discrete Cauchy-Fueter system. In spite of the pure discrete theory, we also studied some convergence problems, which represent the interaction between the discrete theory and the original one. On this topic, we have showed that a continuous function is monogenic if and only if it is the scaling limits of some discrete monogenic functions. Moreover, we also investigated the convergence behaviour of some integral operators arising in the discrete Clifford analysis. “Whether or not this operator is convergent to its continuous counterpart” and “How fast the convergence rate is” all have been solved.