# Young Mathematicians workshop on Several Complex Variables 2016, Abstracts

November 10-13, 2016

**Hendrik Herrmann**

*Embedding of CR manifolds with circle action*

Let $X$ be a compact strongly pseudoconvex CR manifold equipped with a transversal CR $S^1$-action. We present an embedding theorem which says that $X$ can be CR embedded into some $\mathbb{C}^N$ and the embedding is equivariant with respect to some simple $S^1$-action on $\mathbb{C}^N$. The proof is based on Szegö kernel asymptotics for positive Fourier components. This is a joint work with Chin-Yu Hsiao and Xiaoshan Li.

**Genki Hosono**

*On convergence along geodesics between plurisubharmonic functions*

There have been many studies on geodesics in the space of Kähler potentials on a compact complex manifold with respect to Mabuchi metric. By Donaldson and Semmes, it is known that geodesics are written as solutions of complex Monge-Ampère equatios. As a weak solution, the concept of weak geodesics is defined as a supremum of functions with appropriate conditions. In this talk, I consider an analog of weak geodesics between plurisubharmonic functions on pseudoconvex domains. In particular, I give a result that characterizes convergence along geodesics between toric plurisubharmonic functions by means of Lelong numbers.

**Seungro Joo**

*On the scaling methods by Pinchuk and Frankel*

The main purpose of this talk is to study two scaling methods developed by Pinchuk and Frankel. We introduce a continuously-varing global coordinate system, and give an alternative proof to the convergence of Pinchuk's scaling on bounded domains with a finite type boundaries in $\mathbb{C}^2$. Using this, we discuss the following question: what is a good modification of Frankel's scaling to a class of nonconvex domains? We also observe that two scalings are equivalent.

**Yoshikazu Nagata**

*On Lie group structure of automorphism groups*

We give a sufficient condition for complex domains that the automorphism groups become Lie groups. As an application we see that the automorphism group of any strictly pseudoconvex domain or finite type pseudoconvex domain has a Lie group structure.

**Ngoc Cuong Nguyen**

*The Dirichlet problem for a complex Hessian equation on compact Hermitian manifolds with boundary*

This is a joint work with Dongwei Gu. We solve the classical Dirichlet problem for a general complex Hessian equation on a small ball in $\mathbb{C}^n$. Then, we show that there is a continuous solution, in pluripotential theory sense, to the Dirichlet problem on compact Hermitian manifolds with boundary that equipped locally conformal Kähler metric (in particular, Kähler manifolds) provided that there is a subsolution.

**Ryosuke Nomura**

*Negative holomorphic sectional curvature and the Kähler-Ricci flow*

Recently, Wu-Yau and Tosatti-Yang established the connection between the negativity of holomorphic sectional curvatures and the positivity of canonical bundles for compact Kähler manifolds. In this talk, we give another proof of their theorems by using the Kähler-Ricci flow.

**Inyoung Park**

*Joint Carleson measure of composition operators on the weighted Bergman spaces defined on polydisks*

In this talk, I will introduce some basic known results and my studies on the composition operators. Especially, I will talk about a concept of joint Carleson measure to characterize when the difference of two composition operators on weighted Bergman space over the unit polydisk is bounded or compact. It is the analogue extension with the unit ball case [1], but we need some new techniques to obtain the results in the polydisk setting, because of the inequivalence between the unit ball and the unit polydisk.

References

[1] H. Koo, and M. Wang, *Joint Caleson measure and the difference of composition operators on* $A^p_\alpha(\mathbf{B}n)$, J. Math. Anal. Appl. 419(2014), 1119-1142.
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**Feng Rong**

*Quasi-Reinhardt domains and Cartan's Linearity Theorem*

Cartan's linearity theorem states that an origin-preserving automorphism of a bounded circular domain must be linear. We will present the generalizations of this classical result to quasi-circular and quasi-Reinhardt domains, by introducing the notions of "resonance order" and "quasi-resonance order". We also give an explanation of this linearity phenomenon via representative domains. Part of this talk is based on a joint work with Fusheng Deng.

**Yuya Takeuchi**

*CR geometry of Sasaki-$\eta$-Einstein manifolds*

In this talk, we will discuss the properties of some CR invariant objects on Sasaki-$\eta$-Einstein manifolds. In particular, we will prove a product formula for compatibility operators and compute the total $Q$-prime curvature for such manifolds. As an application, we will study the variational properties of total $Q$-prime curvature under deformation of CR structures.

**Jujie Wu**

*A global approximation result by Al Taylor and the strong openness conjecture in $\mathbb{C}^n$*

We improve a global approximation result by Al Taylor in $\mathbb{C}^n$ for holomorphic functions in weighted Hilbert spaces. The main tools are a variation of the theorem of Hörmander on weighted $L^2$-estimates for the $\overline{\partial}$-equation together with the solution of the strong openness conjecture. A counterexample to a global strong openness conjecture in $\mathbb{C}^n$ is also given here.

**Sungmin Yoo**

*Lower bound of holomorphic sectional curvatures of the Bergman metric*

It is well-known that the holomorphic sectional curvature of the Bergman metric is always less than 2. On the other hand, there exists an example constructed by Herbort, the holomorphic sectional curvature is not bounded from below in certain direction. In this talk, we will discuss how to get a lower bound of the curvature by only using Hormander's L2 d-bar method.

**Chengchen Zhong**

*The holomorphic automorphism group of the Cartan-ellipsoid type domain*

We study the maximal holomorphic automorphism group of some non-homogeneous domain called Cartan-ellipsoid type domain. A Cartan-ellipsoid domain $\Omega_D$ is

defined as $\Omega_D = \{(z,w) \in \mathbb{C}^m \times D : \sum_{j=1}^{m} |z_j|^{2r_j} < \Phi(w)\}$, where $\Phi(w) = K_1(w_{(1)}, w_{(1)})^{-s_1} \times \cdots \times K_q(w_{(q)}, w_{(q)})^{-s_q}$, $D = D_1 \times \cdots \times D_q$ is a bounded symmetric domain and $D_j$ is irreducible bounded symmetric domain. $K_j$ is the Bergman kernel function on $D_j$ for $j = 1, 2, \cdots, q$. Parameter $r_1, \cdots, r_m > 1$ and $s_1, \cdots, s_q > 0$. In general, $\Phi(w)$ is not the Bergman kernel function of $D$. There are the special cases here that $s_1 = \cdots = s_q$ and $q = 1$ which have been studied before.