

Titles and Abstracts:

Fusheng Deng:

Title: Linear invariants of complex manifolds and their plurisubharmonic variation

Abstract: We will discuss exhaustion of p -Bergman kernels on bounded domains, and show that two bounded hyperconvex domains are biholomorphic if there is a positive number p which is not even such that: (1) the p -Bergman kernels of the domains are exhaustive, and (2) the spaces of L^p holomorphic functions on the domains are linear isometric. This result shows that spaces of L^p holomorphic functions are important invariants of complex manifolds. The second part of this lecture will show that for a holomorphic family of bounded pseudoconvex domains or compact Kähler manifolds, these invariants form a holomorphic vector bundle over the base with a positively curved singular Finsler metric. This lecture is based on joint works with Professor Zhiwei Wang, Liyou Zhang, and Xiangyu Zhou.

Siqi Fu:

Title: Spectral stability of the $\bar{\partial}$ -Neumann Laplacian

Abstract: The $\bar{\partial}$ -Neumann Laplacian is an archetype of an elliptic operator with non-coercive boundary conditions. It is known that spectral behavior of the $\bar{\partial}$ -Neumann Laplacian is intimately related to the underlying analytic and geometric structures. In this talk, we study spectral stability of the $\bar{\partial}$ -Neumann Laplacian when either the operator or the underlying domain is perturbed. In particular, we establish spectral stability of the $\bar{\partial}$ -Neumann Laplacian under the Kohn-Nirenberg elliptic regularization and under perturbation for smoothly bounded pseudoconvex domains. This talk is based on joint work with Weixia Zhu.

Qingchun Ji:

Title: Recent progress in Nevanlinna's theory of holomorphic mappings.

Abstract: We will introduce the index conditions on divisors by using germ decompositions and a new ramification current as the curvature current of a singular metric. We then discuss Second Main Theorem type results of Nevanlinna theory for differentially/algebraically nondegenerate holomorphic mappings and divisors satisfying our index condition.

Frank Kutzschebauch:

Title: Embedding open Riemann surfaces with isolated punctures into \mathbb{C}^2

Abstract: We enlarge the class of open Riemann surfaces known to be holomorphically embeddable into the plane by allowing them to have additional isolated punctures compared to the known embedding results.

Theorem 0.1. *The following open Riemann surfaces admit a proper holomorphic embedding into \mathbb{C}^2 :*

- *the Riemann sphere with a (nonempty) countable closed subset with at most 2 accumulation points removed,*
- *any compact Riemann surface of genus 1 (torus) with a (nonempty) closed discrete set with at most one accumulation point removed,*
- *any hyperelliptic Riemann surface with a discrete closed set C removed with the properties that C contains a fibre $F = R^{-1}(p)$ (consisting either of two points or a single Weierstrass point) of the Riemann map R and all accumulation points of C are contained in that fibre F .*

The same holds if X is as above with additionally a finite number of smoothly bounded regions removed.

The second and the third case with no accumulation points in the closed discrete set correspond to the Theorem of Sathaye.

Song-Ying Li:

Rigidity type for maps from the unit ball in \mathbb{C}^n

In this talk, I will present two joint works with Jie Luo. First one is about the Forelli type theorem from a starlike to a real Riemannian manifold satisfying certain condition. Second one is about Siu's type rigidity theorem for harmonic maps with complex Neumann type condition from the unit ball to Kähler manifold.

Erik Løw:

Title: The Vaserstein problem for continuous and holomorphic symplectic matrices.

Abstract: We prove that a continuous symplectic matrix on a finite dimensional normal topological space can be factored as a product of elementary continuous symplectic matrices. This uses a result of Calder-Siegel on uniform homotopies. We also prove factorization for 4×4 holomorphic

symplectic matrices on Stein spaces. This uses the continuous case and Gromov's Oka principle for elliptic holomorphic submersions. This is joint work with Björn Ivarsson and Frank Kutzschebauch

Jiafu Ning:

Title: On p -Bergman kernel for bounded domains in \mathbb{C}^n .

Abstract: In this talk, we will discuss some properties of the Bergman kernels by applying L^p extension theorem. We prove that for any bounded domain in \mathbb{C}^n , it is pseudoconvex if and only if its p -Bergman kernel is an exhaustion function, for any $p \in (0, 2)$.

Chunhui Qiu:

Title: Line integration of Ricci curvature and its applications on a Finsler manifold.

Abstract: In this paper, we generalize the results of Gromoll-Meyer and Chicone- Ehrlich on Finsler manifolds. We first use Morse index theory to obtain that if the line integral of the Ricci curvature along a complete geodesic in a Finsler manifold is positive, then the geodesic contains a pair of conjugate points. For an application, we prove that a complete noncompact Finsler manifold with everywhere positive line integral of the Ricci curvature is connected at infinity. Finally, we also give a compactness criteria on a Finsler manifold. This work is joint with Jinling Li.

Jasna Prezelj:

Title: On a class of volume preserving automorphisms in \mathbb{H}^2

Abstract: We give a possible extension for shears and overshears in the case of two non-commutative (quaternionic) variables in relation with the associated vector fields and flows. We present a possible definition of volume preserving automorphisms, even though there is no quaternionic volume form on \mathbb{H}^2 .

Using this, we determine a class of quaternionic automorphisms for which the Ander-sen-Lempert theory applies. Finally, we exhibit an example of a quaternionic automorphism, which is not in the closure of the set of finite compositions of volume preserving quaternionic shears, though its restriction to complex subspace is in the closure of the set of finite compositions of volume preserving complex shears.

Guangbin Ren:

Title: Non-commutative and non-associative SCV

Abstract: Non-commutative and non-associative SCV involves a canonical extension of the theory of several complex variables to the non-commutative and non-associative realm. The first canonical extension was achieved by Gentili and Struppa in 2006. They base upon the book structure of quaternions, as the union of complex planes overlapping at the real axis, to give rise to a natural lift of the holomorphic theory of one complex variable to that of quaternions via slice technique. This theory for quaternions has demonstrated potential applications in quantum physics through its induced concept of s-spectrum since the s-spectrum of a self-adjoint operator turns out to be real in contrast to the spectrum non-real. Instead of quaternions, the theory has been successfully extended to octonions, Clifford algebras, and even any alternative algebra but only restricted to the case of one variable. In this talk, we shall introduce our consideration in several respects. Firstly, we extend the theory of SCV through the slice technique to several octonionic variables. Next, we extend the theory of Riemann domains through the slice technique to quaternions in which the Riemann slice-domain takes the set of quaternions as a model locally but endows with a new slice topology in consistency with the book structure. Finally, we endow octonions with a new book structure by taking the quaternions as a slice so that the associated operator is the slice Dirac operator. This leads to a generalization of the related stem functions from the commutative $O(1)$ setting to the non-commutative $SO(3)$ setting.

Feng Rong:

Title: On the local dynamics near the Wolff point of holomorphic self-maps of the unit ball

Abstract: It is well-known that for a holomorphic self-map of the unit ball without an interior fixed point there exists a unique point on the boundary of the unit ball, called the Wolff point, which is attracting with a boundary dilatation coefficient less than or equal to one. Our focus is on how the interior points approach the Wolff point under iterations. While the less than one case is more or less well-understood, the equal to one case is not so clear. We will describe in details many typical behaviors in dimension two. As a by-product, we will give a dynamical interpretation of the well-known boundary rigidity theorem of Burns-Krantz.

Abstract: We give an overview of some known results about totally real embeddings and immersions of compact manifolds into C^n for low n and

present some new results about totally real embeddings and immersions of five and six manifolds. This is joint work with Rafael Torres.

Nicoletta Tardini:

Title: Relative Čech-Dolbeault homology and applications.

Abstract: We define the relative Dolbeault homology of a complex manifold with currents via a Čech approach. This definition is then used to compare the relative Dolbeault cohomology groups of two complex manifolds of the same dimension related by a suitable proper surjective holomorphic map. Finally, an application to blow-ups is considered.

Maria Trybula:

Title: Estimates for the squeezing Function

Abstract: Estimates for the squeezing function of strictly pseudoconvex domains with applications will be presented.

Fabio Vlacci:

Title: Discrete Actions over the Hyperbolic Quaternionic Space

Abstract: Using Lipschitz and Hurwitz integers $\mathbb{H}(\mathbb{Z})$ and $\text{Hur}(\mathbb{Z})$ in the quaternion division algebra \mathbb{H} , we define several Kleinian discrete subgroups of $PSL(2, \mathbb{H})$. We define first a Kleinian subgroup $PSL(2, \mathfrak{L})$ of $PSL(2, \mathbb{H}(\mathbb{Z}))$. This group is a generalization of the modular group $PSL(2, \mathbb{Z})$. Next we define a discrete subgroup $PSL(2, \mathfrak{H})$ of $PSL(2, \mathbb{H})$ which is obtained by using Hurwitz integers. It contains as a subgroup $PSL(2, \mathfrak{L})$. In analogy with the classical modular case, these groups act on the hyperbolic quaternionic half space. We exhibit fundamental domains of the action of these groups and give detailed representations of these groups.

Wei Wang:

Title: Analysis of the k -Cauchy-Fueter complexes.

Abstract The k -Cauchy-Fueter complexes are quaternionic counterparts of $\bar{\partial}$ -complex in SCV. We consider the non-homogeneous k -Cauchy-Fueter equations over a domain under the compatibility condition, which naturally leads to a Neumann problem. The method of solving the $\bar{\partial}$ -Neumann problem in SCV is applied to this Neumann problem. We introduce notions

of k -plurisubharmonic functions and k -pseudoconvex domains, establish the L^2 estimate and solve this Neumann problem over k -pseudoconvex domains in \mathbb{R}^4 . 0-Cauchy-Fueter complex can be applied to the quaternionic Monge-Ampere operator, and allows us to introduce the notion of a closed positive current in the quaternionic case and to extend several results in complex pluripotential theory to the quaternionic pluripotential theory.

Zhiwei Wang:

Title: New characterization of plurisubharmonic functions and its applications

Abstract: In this talk, we will first present a new characterization of plurisubharmonic functions, and then by introducing fiber product technique and product property of p -Bergman kernels, we show how to use this new characterization to prove plurisubharmonic variation of p -Bergman kernels and positivities of direct image sheaves. This is a joint work with Prof. Fusheng Deng, Liyou Zhang and Xiangyu Zhou.

Joerg Winkelmann:

Title: Tame Discrete Subsets of Complex Linear Algebraic Groups

Abstract: Rosay and Rudin introduced the notion of a “tame” discrete subset of \mathbb{C}^n . We show that most of this theory generalizes to the case of discrete subsets of complex linear algebraic groups without characters. For example, our results imply: Every injective map from $SL_n(\mathbb{Z})$ to $SL_n(\mathbb{Z}[i])$ extends to a bijective holomorphic self-map of the complex manifold $SL_n(\mathbb{C})$.

Yuan Yuan:

Title: Holomorphic isometries from the Poincare disc into bounded symmetric domains

Abstract: I will first overview the classical holomorphic isometry problem between complex manifolds, in particular between bounded symmetric domains. When the source is the unit ball, in general the characterization of holomorphic isometries to bounded symmetric domains is not quite clear. With Shan Tai Chan, we recently characterized the holomorphic isometries from the Poincare disc to the product of the unit disc with the unit ball and it provided new examples of holomorphic isometries from the Poincare disc into irreducible bounded symmetric domains of rank at least 2.