Several Complex Variables
Plusieurs variables complexes
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SOFÍA ORTEGA CASTILLO, CIMAT (Mexico)
Strong pseudoconvexity and Cauchy-Riemann equations

The aim of this talk is to discuss the importance of pseudoconvexity and its strong counterpart as complex analytic and differential geometric phenomena. Then I will present our recent contributions to further understanding strong pseudoconvexity, even in the infinite-dimensional and non-smooth contexts. The rest of the talk will focus on connections to other classical and recent results on strong pseudoconvexity and related complex analytic problems, such as solutions to Cauchy-Riemann equations.

PAUL GAUTHIER, Université de Montréal
Approximation by random holomorphic functions

Brown and Schreiber introduced a point of view which could lead to many questions on "random complex analysis." Andrus and Brown obtained stochastic versions of classical theorems in approximation in a single variable. We propose a similar investigation in several complex variables.

XIANGHONG GONG, University of Wisconsin-Madison
Hölder estimates for homotopy operators on strictly pseudoconvex domains with C^2 boundary

We derive a new homotopy formula for a strictly pseudoconvex domain of C^2 boundary in $\mathbf{C}^n$ by using a method of Lieb and Range and obtain estimates in Lipschitz spaces for the homotopy operators. For $r > 1$ and $q > 0$, we obtain a $\Lambda_{r+1/2}$ solution u to $\overline{\partial} u = f$ for a $\overline{\partial}$-closed $(0, q)$ form f of class Λ_r in the domain. We apply the estimates to obtain boundary regularities of $\mathcal{D}$-solutions for a domain in the Levi-flat Euclidean space.

PURVI GUPTA, University of Western Ontario
A nonpolynomially convex isotropic torus with no attached discs

In 1985, Gromov proved that every compact Lagrangian submanifold in $\mathbb{C}^n$ has a holomorphic disc attached to it. In this talk, we will present an explicit real-analytic example in $\mathbb{C}^3$ to show that Gromov's result does not hold for isotropic submanifolds (the subcritical case) even in the absence of polynomial convexity.

JORGE GUILLERMO HOUNIE, Department of Mathematics, Federal University of São Carlos
A Hopf lemma for holomorphic functions in Hardy spaces and applications to CR mappings

Let $\Delta^+ = \{z \in \mathbb{C} : |z| < 1, \operatorname{Im} z > 0\}$ be the half-disc and $E = \{x : -1 < x < 1\}$ its diameter. Let f be a holomorphic function on Δ^+ and assume that $f(z) = o(z^n)$ for all positive integers n. Alexander's theorem [A] states that that if f is continuous up to E, and the image $f(E)$ is "non-spiraling", then $f \equiv 0$ on Δ^+. This generalizes previous results due to several authors, namely, S. Alignac, M. S. Baouendi, P. Ebenfelt, X.J. Huang, S.G. Krantz, M. Lakner, D. Ma, Y. Pan and L. Rothschild.

In this talk we will discuss extensions of Alexander's result to the case in which f is not necessarily continuous up to E but belongs to a Hardy class. We will present applications to unique continuation of CR mappings between hypersurfaces.

This is joint work with S. Berhanu.

References

[A] H. Alexander, *A weak Hopf lemma for holomorphic mappings,* Indag. Math. **6**, (1995), 1–5.

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DAMIR KINZEBULATOV, Université Laval
Kohn decomposition for forms on coverings of complex manifolds constrained along fibres

The classical result of J.J.Kohn asserts that over a relatively compact subdomain D with C^∞ boundary of a Hermitian manifold whose Levi form has at least $n-q$ positive eigenvalues or at least $q+1$ negative eigenvalues at each boundary point, there are natural isomorphisms between the (p,q) Dolbeault cohomology groups defined by means of C^∞ up to the boundary differential forms on D and the (finite-dimensional) spaces of harmonic (p,q)-forms on D determined by the corresponding complex Laplace operator. In the present paper, using Kohn's technique, we give a similar description of the (p,q) Dolbeault cohomology groups of spaces of differential forms taking values in certain (possibly infinite-dimensional) holomorphic Banach vector bundles on D. We apply this result to compute the (p,q) Dolbeault cohomology groups of some regular coverings of D defined by means of C^∞ forms constrained along fibres of the coverings.

Joint with A. Brudnyi.

ILYA KOSSOVSKIY, Masaryk University, Brno
Classification of 3-dimensional real-analytic CR-manifolds

The classification problem for real-analytic hypersurfaces in complex space under the action of the group of local CR-diffeomorphisms has attracted considerable attention in the last 50 years. In the Levi-nondegenerate case, it was solved in the seminal work of Cartan, Tanaka and Chern-Moser. In the Levi-degenerate but finite type case, a solution in complex dimension 2 was obtained by Kolar. However, in the infinite type case the problem remains open, even in complex dimension 2.

In our joint work with Ebenfelt and Lamel, we solve the CR-equivalence problem for infinite type hypersurfaces in $\mathbb{C}^2$ satisfying the generic condition of non-resonancy. We do so by constructing a complete normal form for such hypersurfaces. The normal form construction is done by a recent technique of interpreting CR-manifolds as appropriate Dynamical Systems, and solving subsequently the classification problem for the later objects.

In this talk, I will give an overview of the latter result.

LOREDANA LANZANI, Syracuse University
Holomorphic Singular Integrals: counterexamples to the L^p theory

This talk concerns recent and ongoing joint work with E. M. Stein on the optimality of the (analytic and geometric) assumptions that grant L^p-regularity for families of singular integral operators in higher dimension that are modeled after the one-dimensional Cauchy integral and the Szego projection. As is well known, dimension-induced obstructions (e.g., lack of conformal mapping) have major repercussions on the classical, one-dimensional theory.

NORDINE MIR, Texas A&M University Qatar
Convergence of formal CR transformations

We will discuss recent results regarding the convergence of formal holomorphic mappings between real-analytic CR submanifolds in complex spaces of (possibly) different dimensions. This is a joint work with Berhnard Lamel (Univ. of Vienna).

ALCIDES LINS NETO, IMPA

Logarithmic foliations of codimension greater than one

In this talk we consider foliations of codimension k¿1 defined by closed logarithmic k-forms, both in the local case (germs) and in the global case on projective spaces. In the case of projective spaces, when the divisor of poles is normal crossing, we give normal forms and prove that a codimension k¿1 foliation is the intersection of k codimension one logarithmic foliations.

JORGE VITÓRIO PEREIRA, IMPA

Holonomy of compact leaves

This talk will discuss how the global geometry of a codimension singular foliation on a compact Kahler manifold imposes restrictions on the holonomy representations of compact leaves. In particular, we will show that compact leaves with abelian and non-linearizable holonomy are analytically normalizable.

ARTURO FERNÁNDEZ PÉREZ, Federal University of Minas Gerais - UFMG

Residue-type indices, applications to holomorphic foliations and Levi-flat hypersurfaces

We study residue-type indices for germs of holomorphic foliations in the plane. We characterize a family of foliations called second type foliations by an expression involving the Baum-Bott, variation and polar excess indices. We also give some applications to real-analytic Levi-flat hypersurfaces in compact complex surfaces.

EUGENE POLETSKY, Syracuse University

Hausdorffization of the space of equivalence classes

Let X and M are connected and locally path connected Hausdorff topological spaces (so they are path connected) and let $F : X \to M$ be a continuous mapping such that for every $x \in M$ the set $F^{-1}(x)$ is locally path connected. We introduce on X an equivalence relation: $x \sim y$ if x and y belong to the same connected component of $F^{-1}(x)$ and denote the quotient $X/\sim$ by X_F endowed with the quotient topology. In general, the space X_F need not to be Hausdorff even in simple situations. For example, let X be the strip $\{(x, y) : -2 \le y \le 2\}$ in the plane with the ray $\{x \ge 0, y = 0\}$ cut out, M is the x-axis and $F(x, y) = x$.

There are several examples, pertinent to complex analysis, where X_F is seemingly non-Hausdorff. In our talk we will describe an algorithm that reduces X_F to a Hausdorff space without the loss of information and demonstrate how it can be applied to known examples.

LIZ VIVAS, Ohio State University

Parabolic skew-products and parametrization

It is a classical result that parametrizaion of unstable manifolds on hyperbolic holomorphic maps can be obtained by a limit of iterates of the map composed with an appropriate inverse action. In this talk I will generalize this result for skew-product invariant holomorphic maps that are parabolic. I will first give an overview of the results known in one and several complex dimensions.

EDUARDO SANTILLAN ZERON, CINVESTAV

A broad view of q-plurisubharmonicity and q-pseudoconvexity

The main objective of this talk is to present the interesting relations that appears between the convex, plurisubharmonic, and holomorphic functions, and their generalisations: the q-convex, q-plurisubharmonic, and q-holomorphic functions. In particular, since convex and subharmonic functions are naturally defined as sub-solutions (in the viscous sense), their generalizations also have a *natural* definition as sub-solutions. Nevertheless, these interesting relations break apart when the q-plurisubharmonic functions are used to defined and analyse the q-pseudoconvex and relative q-pseudoconvex sets. in particular, we present two sets $U \subset V$ and a fixed neighbourhood W of the boundary bU, such that U is pseudoconvex in V, but every plurisubharmonic function defined on U is bounded from above on $W \cap U$.

YUNUS E ZEYTUNCU, University of Michigan-Dearborn
Friedrichs Operator on Pseudoconvex Domains in $\mathbb{C}^n$

Let Ω be a smooth bounded domain in $\mathbb{C}^n$ and let $L^2(\Omega)$ denote the space of square integrable functions on Ω with respect to the Lebesgue measure. We denote the subspace of holomorphic functions in $L^2(\Omega)$ by $A^2(\Omega)$ and the Bergman projection from $L^2(\Omega)$ to $A^2(\Omega)$ by $\mathbf{B}$.

The Friedrichs operator T is a conjugate linear mapping from $A^2(\Omega)$ onto itself, defined by $f \to \mathbf{B}(\overline{f})$. It was recently observed that this operator exhibits some additional smoothing properties under certain geometric assumptions on the domain. In this talk, after a quick review these results, we will prove that T is compact on any pseudoconvex domain without any further geometric conditions. We will also discuss some further implications of this observation.