Complex Analysis and Complex Geometry
Analyse complexe et géométrie complexe

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ILIA BINDER, University of Toronto

Constructive Caratheodory Theory

I will discuss the question of computability of the boundary extension of a conformal map. I will talk about necessary and sufficient geometric conditions for such a computability. I will also discuss the corresponding complexity bounds. This is a joint work with C. Rojas and M. Yampolsky.

THOMAS BLOOM, University of Toronto

Complex zeros of random polynomials

Given a compact set $K \subset \mathbb{C}^m$, and τ an appropriate measure on K we consider random polynomials $H_n(z)$ whose coefficients with respect to an orthonormal basis in $L^2(\tau)$ for polynomials of total degree $\leq n$ are independent, identically distributed random variables having a general distribution (which includes normal complex and real Gaussians). We prove the almost sure convergence of $\frac{1}{n}\log|H_n(z)|$ in L^1_{loc} to the pluricomplex Green function of K and also the almost sure convergence of the zero currents of the random polynomials. This is joint work with N.Levenberg.

ALEXANDER BRUDNYI, University of Calgary

Banach-valued Holomorphic Functions on the Maximal Ideal space of H^∞ and the Operator Corona Problem

I survey some recent results on Banach-valued holomorphic functions defined on the maximal ideal space of the Banach algebra of bounded holomorphic functions on the unit disk with pointwise multiplication and supremum norm. This theory has much in common with the classical theory of holomorphic functions on Stein manifolds.

DEBRAJ CHAKRABARTI, Central Michigan University

Complex Analysis on Product Domains

Product domains are an important class of examples in several complex variables. Poincaré observed as early as 1907 that the unit ball in $\mathbb{C}^2$ is not biholomorphic to the unit bidisc. Product domains are only piecewise smooth and the smooth part of the boundary is Levi-flat.

We shall discuss recent work on function theory and mappings of product domains, in particular boundary behavior of functions and maps on products of pseudoconvex domains. It turns out that not all mysteries of this classical topic are completely understood yet. We will also discuss properties of two classes of domains closely related to product domains: symmetric products and domains with generic corners.

This is joint work with M.-C. Shaw, K. Verma and S. Gorai.

DAN COMAN, Syracuse University

Convergence of the Fubini-Study currents for singular metrics on line bundles and applications

Let L be a holomorphic line bundle over a compact Kähler manifold X endowed with a singular Hermitian metric h with positive curvature current $c_1(L,h)$. We prove generalizations to this setting of the Tian-Yau-Zelditch theorem, by showing that suitable powers $p^{-k}\gamma_p^k$ of the Fubini-Study currents γ_p associated to the spaces of L^2-holomorphic sections of $L^{\otimes p}$ converge weakly on X to $c_1(L,h)^k$. As shown by Shiffman and Zelditch in the case of ample line bundles, this yields equidistribution results for the common zero sets of k-tuples of random holomorphic sections of $L^{\otimes p}$ as $p \to \infty$. We apply this to prove approximation theorems for $c_1(L,h)^k$ by currents of integration along zero sets of holomorphic sections of $L^{\otimes p}$. The results are joint work with George Marinescu.

PETER EBENFELT, University of California, San Diego

PAUL GAUTHIER, Université de Montréal
Holomorphic Extension-Interpolation

The following is essentially the sheaf property of holomorphic functions.

Theorem. A function $f : U \to \mathbb{C}$ defined on an open set $U \subset \mathbb{C}^n$ is holomorphic if it is holomorphic in a neighborhood of each point of U.

The next theorem is the famous theorem of Hartogs on separate holomorphy.

Theorem. A function $f : U \to \mathbb{C}$ defined on an open set $U \subset \mathbb{C}^n$ is holomorphic if, for each complex line ℓ in a coordinate direction, the restriction of f to $\ell \cap U$ is holomorphic.

Our purpose is to find analogous results when the open set is replaced by an arbitrary subset E of $\mathbb{C}$ or, more generally, of a one-dimensional complex analytic subset of $\mathbb{C}^n$.

GORDON HEIER, University of Houston
Projective Kaehler manifolds of semi-negative holomorphic sectional curvature

We will discuss semi-positivity theorems for the canonical class of projective Kaehler manifolds of semi-negative holomorphic sectional curvature. The structure of such manifolds can be understood especially well under the additional assumption of positive (in particular, maximal) Albanese dimension. The methods used are a mixture of differential geometric and algebraic geometric techniques. This is joint work with Steven Lu and Bun Wong.

LASZLO LEMPERT, Purdue University
The curvature of direct images of holomorphic vector bundles

We consider holomorphic fiber bundles, i.e., holomorphic submersions p between complex manifolds Y and S. Given a hermitian holomorphic vector bundle over Y, its direct image under p is sometimes itself a hermitian holomorphic vector bundle, but often it is a more general object. In the talk we will discuss the notion of curvature of such direct images, and the relationship between the curvature of the original bundle and that of its direct image. We will also discuss applications.

EUGENE POLETSKY, Syracuse University
Filling holes in Riemann domains

Let W be a domain in a complex manifold M and let $S(W,M)$ is the space of all analytic disks in M whose boundary lies in W. We say that W has a dent if there is $f \in S(W,M)$ that does not lie in W but can be contracted in $S(W,M)$ to a point. B. Joricke showed that when M is Stein the dents can be filled and the result is the envelope of holomorphy of W which has no dents by its definition.

We say that W has a hole if there is $f \in S(W,M)$ that does not lie in W and cannot be contracted in $S(W,M)$ to a point. In our talk we will discuss how to fill holes and (sub)extend (plurisubharmonic) and holomorphic functions to the fillings.

This is a joint work with D. Dharmasena and F. Larusson.

LIZ VIVAS, Universidad Federal Fluminense (UFF)
Non-autonomous basins

I will discuss known results on a question by Bedford: are the stable manifolds occurring in invertible holomorphic dynamical systems biholomorphically equivalent to Euclidean space? This problem can be translated to a question about non-autonomous basins. I will also describe some new results.

MIRCEA VODA, University of Toronto
On Separation of Eigenvalues for Quasiperiodic Schroedinger Operators

In the past decade, great progress has been made in the study of Schroedinger operators with analytic potentials by employing complex analytic methods. I will give an overview of these methods and I will discuss a recent result, obtained jointly with Ilia Binder, on separation of the finite scale eigenvalues for quasiperiodic Schroedinger operators.