mw- polar sets

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We consider the class of m- weak subharmonic (m - wsh) functions, defined by with relation

(1)
$$dd^c u \wedge (dd^c |z|^2)^{n-m} \ge 0.$$

As we see below this class wider than the class of psh functions, but strongly contains in the class of sh functions.

In our talk we will give a nontrivial example of mw- polar set in the space \mathbb{C}^3 . Example. We consider a function

 $u = \ln[(z_1 + \bar{z}_1)^2 + (z_2 + \bar{z}_2)^2 + (z_3 + \bar{z}_3)^2] = \ln|z + \bar{z}|^2 = \ln(x_1^2 + x_2^2 + x_3^2) + \ln 4,$

where $z_j = x_j + iy_j$, j = 1, 2, 3. We show that it is 2 - wsh function in \mathbb{C}^3 . Thereby we have, that real 3dimensional surface $\mathbb{R}^3(x) = \{z \in \mathbb{C}^3 : Imz = 0\}$ is 2w- polar in \mathbb{C}^3 .

On Asymptotic Expansion of the Conormal Symbol of the Singular Bochner-Martinelli Operator

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We study the conormal symbol of the singular Bochner-Martinelli integral on a compact closed surface with conical wedges S in \mathbb{C}^n and evaluate its asymptotic expansion. Keywords: singular Bochner-Martinelli operator, conormal symbol, conical wedges.

Universal Functions

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In 1929 Birkhoff showed the existence of an entire function which is universal in the sense that its translates approximate all entire functions. In 1975 Voronin proved a spectacular theorem stating that the Riemann zeta-function exhibits a strong form of universality. In this context, Bagchi in 1982 gave a statement equivalent to the Riemann Hypothesis. Some universality results have been shown also in several complex variables.

Some examples of analytic discs

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In this talk we discuss the notion of pluripolarity of analytic discs. We provide some examples of such discs.

Integral formulas for some matrix domains

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In this talk we give Cauchy-Szego and Poisson integral formulas for matrix balls of three types, which are analogues of Cauchy-Szego and Poisson integral formulas for classical Kartans domains.

On systems of non-algebraic equations of \mathbb{C}^n

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A method and corresponding algorithm of finding residue integrals for systems of non- algebraic equations containing entire functions of finite order of growth are presented. Such integrals are connected to the power sums of roots for a certain system of equations. The described approach can be used for developing methods for elimination of unknowns from systems of non-algebraic equations.

Complex-valued model of forecasting the development of rural sector of Uzbekistan Sevara Kuchkarova

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We will discuss the different possibilities of Agriculture of the Republic of Uzbekistan. As characteristics of the study, we take the functions of complex variables and its applications in economics. We consider a group of problems and models of forecasting the development of Agricultural branches and provide a discussions based on the complex-valued econometric models, estimation of efficiency and calculations errors. The econometric model of complex variables, in general view, is possible to present as regression dependence of complex economic indicator wfrom one or several complex variables z_j : $w = f(z_j) + \epsilon$. Here: w is the complex resultant economic indicator consisting of the valid w_r and imaginary parts w_i ; z_j , $j = 1, 2, \ldots$ are complex economic factors (or factor), considered as reason of dynamics w; ϵ is a complex error of approximation. Note that such models of forecasting are used for the first time in Uzbekistan, however we used methods of Svetunkov (see Basic Econometrics of complex variables. - SPb.: Publishing house SPbGUEF, 2008).

Random polynomials, (pluri-)potential theory, and equidistribution of zeros

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We begin with a standard result in the theory of random polynomials in \mathbb{C} starting with the classical setting of Kac-Hammersley: $p_n(z) = \sum_{j=0}^n a_j z^j$ where the coefficients $a_0, ..., a_n$ are i.i.d. complex Gaussian random variables with $\mathbf{E}(a_j) = \mathbf{E}(a_j a_k) = 0$ and $\mathbf{E}(a_j \bar{a}_k) = \delta_{jk}$. Then, following work of Shiffman, Zelditch,

Bloom, et al, we discuss the use of potential theory and pluripotential theory in proving results concerning the asymptotic behavior of zero sets of general random polynomials and polynomial mappings in \mathbb{C} and \mathbb{C}^m , m > 1. In particular, the coefficients of the random polynomials need not be complex Gaussian (joint work with Tom Bloom). We end with a generalization of our situation to the case of random holomorphic sections of tensor powers of a positive holomorphic line bundle over a projective manifold due to Turgay Bayraktar.

Critical sets of proper holomorphic mappings

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It is shown that if a proper holomorphic map $f: \mathbb{C}^n \to \mathbb{C}^n$, $1 < n \leq N$, sends a pseudoconvex real analytic hypersurface of finite type into another such hypersurface, then any n-1 dimensional component of the critical locus of f intersects both sides of M. We apply this result to the problem of boundary regularity of proper holomorphic mappings between bounded domains in \mathbb{C}^n .

Quillen property of real algebraic varieties

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A characterisation of all real algebraic sub varieties (with possible nilpotents) of Hermitian space on which all positive polynomials are sums of hermitian squares will be give, in terms of real algebra, complex geometry and matrix representations. Joint work with Claus Scheiderer.

Capacity dimension of the Brjuno set

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The set \mathcal{B} of Brjuno numbers arises in connection with the problem of linearization of holomorphic germ $f(z) = \lambda z + a_2 z^2 + \dots$ in a neighborhood of point z = 0:

$$\varphi(z) \circ f(z) \circ \varphi^{-1}(z) = \lambda z,$$

where φ is a germ of holomorphic function in the neighborhood of z = 0, $\varphi'(0) \neq 0$. This problem is important in Complex Dynamics, to describe the dynamics $f^n = f \circ \ldots \circ f$ in a neighborhood of fixed point. For $|\lambda| \neq 0, 1$ the linearization always is possible, according to the theorem G. Königs. However, for $\lambda = e^{2\pi\alpha i}$ with irrational $\alpha \in \mathbb{R}$, the question is answered in terms of Brjuno numbers (Brjuno and Yoccoz): any convergent germ $f(z) = e^{2\pi\alpha i}z + a_2z^2 + \ldots$ is linearizable if and only if $\alpha \in \mathcal{B}$ is a Brjuno number.

The main result of our talk is

Theorem 3. The complement $\mathbb{R}\setminus\mathcal{B}$ of the Brjuno set has zero C_{σ} -capacity with respect to the kernel $k_{\sigma}(z,\xi) = |\ln |z - \xi||^{\sigma}$, $\sigma > 2$.

m - wsh and m - sh functions

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The classical potential theory is based on the Laplace operator and subharmonic (sh) functions, $\Delta u \ge 0$. The pluripotential theory constructed in the 1980s is based on plurisubharmonic (psh) functions, $dd^c u \ge 0$, and is related to the Monge-Ampère equation

(2)
$$(dd^c u)^n = f\beta^n, f \ge 0.$$

where $\beta = dd^c |z|^2$ is the fundamental volume form in \mathbb{C}^n . The goal of the present talk is to study the equation

(3)
$$(dd^c u)^m \wedge \beta^{n-m} = f\beta^n, f \ge 0$$

Equation (2) is called the *complex Hessian equation*. On the analogy of classical and pluripotential theories we show that equation (2), in particular, the homogeneous equation may be solved using the class, so called m - wsh (weak *m*-subharmonic) and m - sh functions.

Polynomially convex hulls of singular real manifolds

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We obtain local and global results on polynomially convex hulls of Lagrangian and totally real submanifolds of \mathbb{C}^n with self-intersections and open Whitney umbrella points.

A direct proof of Gromov's Non-Squeezing Theorem

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In his celebrated paper of 1985, Gromov developed a theory of J-complex (pseudoholomorphic) curves as a powerful tool in symplectic geometry. One of the head-lines of that paper is the Non-Squeezing Theorem. It says that the unit ball $B^{(2n)}$ in $R^{(2n)}$, n > 1, can be symplectically embedded in the "cylinder" $rB^2 \times R^{(2n-2)}$, only if the radius r of the base of the cylinder is at least 1. The original proof as well as more recent versions are quite involved. In this talk we present a simple direct proof that uses only the standard scheme for solving the Beltrami equation in one variable. This work is joint with Alexander Sukhov.

Polynomial hulls containing higher orders of analytic structure

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For a compact set $K \subset \mathbb{C}^n$, the polynomial convex hull of K is the set of all $w \in \mathbb{C}^n$ such that for every polynomial P(z), |P(w)| is less than or equal to the maximum modulus of P(z) on K. A typical problem is to try to decide whether the polynomial convex hull of a set is composed of 1-dimensional *analytic structure*, i.e., analytic varieties with boundary in K. In this talk we discuss conditions where higher dimensional analytic structure can be found. Let S^{n-1} be the unit sphere in \mathbb{C}^n , and $K \subset S^{n-1} \times \mathbb{C}$. Then we examine when the polynomial convex hull of K contains graphs of analytic functions over the ball.