
Complex Analysis and Operator Theory
Analyse complexe et théorie des opérateurs

(Org: **Iliia Binder** (University of Toronto), **Damir Kinzebulatov** (Université Laval) and/et **Javad Mashreghi** (Université Laval))

IEVGEN BILOKOPYTOV, University of Manitoba
Maximum modulus principle for multipliers

In this talk I will show that (not necessarily holomorphic) multipliers of a wide class of normed spaces of continuous functions over a connected Hausdorff topological space cannot attain their multiplier norms, unless they are constants.

THOMAS BLOOM, University of Toronto
Asymptotic zero distribution of random orthogonal polynomials

We consider random polynomials of the form $H_n(z) = \sum_{j=0}^n \xi_j q_j(z)$ where the $\{\xi_j\}$ are i.i.d. non-degenerate complex random variables, and the $\{q_j(z)\}$ are orthogonal polynomials ($\deg q_j = j$) with respect to an appropriate compactly supported measure in the plane. The problem is to understand (probabilistically) the behavior of the zeros of H_n as $n \rightarrow \infty$.

Study of the Kac Ensemble, (when $q_j(z) = z^j$) goes back to the 1950's.

I will present recent results on the almost sure convergence and the convergence in probability of the zeros. This is work of Ibragimov and Zaporozhets, D. Dauvergne and myself.

ALEX BRUDNYI, University of Calgary
TOWARD SOLUTION OF THE MULTIVARIATE CORONA PROBLEM

We present a new approach to the multivariate corona problem for the algebra of bounded holomorphic functions on an open polydisk.

CHENG CHU, Université Laval
Which de Branges-Rovnyak spaces have complete Nevanlinna-Pick property?

Complete Nevanlinna-Pick kernels are related to Nevanlinna-Pick interpolation problem. Many properties of the Hardy space carry over to other spaces with complete Nevanlinna-Pick property. A natural question is to decide which reproducing kernel Hilbert spaces have complete Nevanlinna-Pick property. We characterize the de Branges-Rovnyak spaces with complete Nevanlinna-Pick property. Our method relies on the general theory of reproducing kernel Hilbert spaces.

GALIA DAFNI, Concordia University
Extension and approximation for VMO on a domain

In joint work with Almaz Butaev, we study the question of extension of functions of vanishing mean oscillation on a domain $\Omega \subset \mathbb{R}^n$ to $VMO(\mathbb{R}^n)$. For the case of bounded mean oscillation (BMO), it was shown by P. Jones (1980) that a bounded extension is possible if and only if Ω is a uniform domain. By suitably modifying Jones' extension we are able to use a single operator to extend BMO and VMO as well as other function spaces. This question turns out to be related to approximation of VMO functions by Lipschitz functions. We also study the question in the local setting.

RICHARD FOURNIER, Dawson College and CRM (Montréal)
On a polynomial inequality of Schur

In this talk, I shall compare a polynomial inequality due to Dryanov, Fournier and Ruscheweyh (see J. Approx.Theory 136(2005), 84–90) to another one attributed to Isai Schur (see J. Approx.Theory 182(2014), 103–109) and observe that they indeed are independent one of each other.

PAUL GAUTHIER, Université de Montréal

Universality, polynomial approximation and the Riemann Hypothesis

Two observations. Firstly, the universality of the Riemann Hypothesis easily yields a conjecture equivalent to the Riemann Hypothesis. Secondly, we recall an interesting and plausible conjecture of Andersson on polynomial approximation, which has been partially confirmed with much effort and which (if correct) suggests the Riemann Hypothesis fails.

ADI GLUCKSAM, University of Toronto

Growth of measurably entire function and related questions

Let T be the action of the complex plane on the space of entire functions defined by translations, i.e T_w takes the entire function $f(z)$ to the entire function $f(z + w)$. B.Weiss showed in '97 that there exists a probability measure defined on the space of entire functions, which is invariant under this action. In this talk I will present (almost) optimal bounds on the minimal possible growth of functions in the support of such measures, and discuss other growth related problems inspired by this work. The talk is partly based on a joint work with L. Buhovsky, A.Logunov, and M. Sodin.

ISAO ISHIKAWA, RIKEN

On the boundedness of composition operators on reproducing kernel Hilbert spaces with analytic positive definite functions

In this talk, I will explain our result which says boundedness of composition operators of maps implies the maps are affine maps in certain situations. Our problem originally comes from the applied mathematics. Composition operators (Koopman operators) are classically investigated in the theory of function space and complex analysis, but, they have been getting popular in the context of machine learning and data analysis these days. Besides, reproducing kernel Hilbert spaces with analytic positive definite functions on euclidean spaces are utilized in many fields in engineering and statistics. On the other hand, although it is important to prove the relation between the properties of maps and those of composition operators of the maps to guarantee theoretical validity, such relation is currently not known very well. In some important situation, we prove that a map become an affine map if its composition operator is bounded on an RKHS associated with analytic positive definite functions on euclidean spaces. This is the joint work with Masahiro Ikeda (RIKEN/Keio University) and Yoshihiro Sawano (Tokyo metropolitan University/RKEN)

JAVAD MASHREGHI, Laval

ERIC SAWYER, McMaster University

Two weight testing theory

We report on recent results in the theory of two weight testing, aka T1 theorems, including joint works with Tuomas Hytonen, Kangwei Li, Chun-Yen Shen, Ignacio Uriarte-Tuero, Robert Rahm and Brett Wick

RASUL SHAFIKOV, University of Western Ontario

Polynomially and rationally convex embeddings

I will discuss recent developments in polynomially and rationally convex embeddings of real submanifolds into complex Euclidean spaces.

MOHAMMAD SHIRAZI, University of Manitoba

Grunsky Operator and Inequality for Open Riemann Surfaces with Finite Borders

Consider an open Riemann surface Σ of genus $g > 0$ with $n > 1$ borders, each one homeomorphic to the unit circle. The surface Σ can be described as a compact Riemann surface \mathcal{R} of the same genus g , from which n simply-connected domains $\Omega_1, \dots, \Omega_n$, removed; that is, $\Sigma = \mathcal{R} \setminus \cup cl(\Omega_k)$. Fix conformal maps f_k from the unit disc \mathbb{D} onto Ω_k , $k = 1, \dots, n$. We may assume each f_k has a quasiconformal extension to an open neighbourhood of \mathbb{D} . Let $\mathbf{f} = (f_1, \dots, f_n)$.

I will define the *Grunsky operator* $Gr_{\mathbf{f}}$ corresponding to \mathbf{f} (equivalently to Σ) on some Dirichlet spaces when all the boundary curves are quasicircles in \mathcal{R} . I will show that the norm of the Grunsky operator is less than or equal to one. This is a generalization of the classical *Grunsky inequalities* from the planar case to bordered Riemann surfaces described above.

Joint work with E. Schippers and W. Staubach.

IGANCIO URIARTE-TUERO, Michigan State University

Two weight norm inequalities for singular and fractional integral operators in R^n .

I will report on recent advances on the topic, related to proofs of T1 type theorems in the two weight setting for Calderón-Zygmund singular and fractional integral operators, with side conditions, and related counterexamples. Mostly joint work with Eric Sawyer and Chun-Yen Shen.

The talk will be self-contained and provide a general overview of the area plus some recent advances. Eric Sawyer's talk in this same session will provide more specifics on the latest advances.