Complex Analysis and Operator Theory
Analyse complexe et théorie des opérateurs
(Org: **Javad Mashreghi** and/et **Thomas T. Ransford** (Laval))

LINE BARIBEAU, Université Laval
A new necessary condition for the spectral Nevanlinna-Pick problem

Let $U \subset \mathbf{C}$ be the unit disc, and denote by Ω_n the set of $n \times n$ complex matrices with spectral radius < 1. The spectral Nevanlinna-Pick problem asks for necessary and sufficient conditions on the (distinct) numbers $z_1, \ldots, z_m \in U$, and on the matrices $W_1, \ldots, W_m \in \Omega_n$ for the existence of a holomorphic function $F \colon U \to \Omega_n$ which satisfies $F(z_j) = W_j$ for all j. This very difficult problem has only been solved for $n = m = 2$. We will present a new Schwarz lemma and apply it to examples with $m > 2$ that could not be decided with previous Schwarz lemmas.

CATHÉRINE BÉNÉTEAU, University of South Florida
Cyclicity in the Dirichlet Space: a Constructive Approach

In this talk, I will consider functions that belong to the classical Dirichlet space, the space of analytic functions in the disk whose derivatives are square area integrable. In particular, I will examine the cyclic functions in this space, that is the functions whose polynomial multiples generate the whole space. I will give a brief survey of some well-known results relating cyclicity of a function to its boundary zero set, including the work of Brown and Shields as well as more recent progress made by El-Fallah, Kellay, and Ransford. I will then discuss an interesting question of how to construct, for some examples of cyclic functions f, the polynomials p such that pf approaches 1 in the Dirichlet norm, and examine questions of rate of "best approximation" in this context. This work is joint with Alberto Condori, Constance Liaw, Daniel Seco, and Alan Sola.

ABTELLATIF BOURHIM, Syracuse University
Some Problems on Linear Preservers

We give a general introduction to the subject of linear preservers, and discuss some new related results and problems.

RAPHAËL CLOUÂTRE, Indiana University
Similarity results for operators of class C_0 and the algebra $H^\infty(T)$

Any C_0 operator T is quasisimilar to its Jordan model. The purpose of this talk will be to investigate when the relation of quasisimilarity in the previous statement can be improved to similarity. More precisely, we study the algebra $H^\infty(T)$ associated to the operator and obtain similarity to the model in the case where the minimal function can be written as a product of inner functions satisfying the so-called generalized Carleson condition.

OMAR EL-FALLAH, Université Mohammed V Agdal -Rabat-
Some Examples of composition operators in Schatten classes

Let φ be an analytic self map of the unit disc and C_φ be the composition operator on the Hardy space with symbol φ. In this talk, we give some explicit sufficient conditions to ensure that C_φ belongs to the schatten class.

RICHARD FOURNIER, Dawson College and CRM
A reversed triangle inequality for polynomials

Let $P(n)$ be the vector space of complex polynomials of degree at most n, endowed with the sup norm on the unit disc. We shall discuss inequalities of the type $|p - p(0)| < n(|p| - |p(0)|)$, valid for all non-constant p in $P(n)$.

PAUL GAUTHIER, Univesité de Montréal
Zero-free polynomial approximation on trees of Jordan domains

By a polynomial approximation set we understand a compact subset of the complex plane on which every function plausibly approximable by polynomials is indeed approximable by polynomials. The famous theorem of Sergei Mergelyan asserts that a compact set is a polynomial approximation set if and only if it's complement is connected. If A and B are compact connected sets with connected complements, we show that $A \cup B$ has connected complement if and only if $A \cap B$ is connected. As a corollary, we have a characterization of connected polynomial approximation sets for which the union is also a polynomial approximation set. These results are applied to the problem of approximating a function having no zeros on the interior of a set by polynomials having no zeros on the set. The latter problem is related to the universality of the Riemann zeta-function. This is joint work with Johan Andersson (Stockholm University) and extends joint work with Greg Knese (University of Alabama).

KARIM KELLAY, IMB Univ. Bordeaux I
Sampling, interpolation and Riesz bases in small Fock spaces

Abstract. We study sampling, interpolation and Riesz bases in small radial weighted Fock spaces. This is joint work with A.Baranov. A.Dumont and A.Hartmann

Titre : Echantillonnage, interpolation et bases de Riesz dans les petits espaces de Fock.

Résumé. Nous étudions l'échantillonnage, l'interpolation et les bases de Riesz dans les espaces de Fock à croissance radial lente. Il s'agit d'un travail en commun avec A.Baranov. A.Dumont et A.Hartmann

---

DIMA KHAVINSON, University of South Florida
Analytic functions in Smirnov classes with real boundary values.

Analytic functions in Hardy spaces H^p, $p \geq 1$ with real boundary values a.e., are constants, since those functions are representable by Poisson integrals of their boundary values. In domains whose rectifiable Jordan boundaries have corners or cusps, functions representable by Cauchy integrals of their boundary values, where these boundary values belong to Lebesgue spaces $L^p(ds)$, $1 \leq p < 2$, where ds is the arclength, are called Smirnov E^p functions. E^p- functions with real boundary values need not be constants . In a recent joint work with Lisa De Castro, we have characterized the existence of non-constant functions in Smirnov classes E^p, $1 \leq p < 2$, with real boundary values in terms of the geometry of the boundary. We have also given the precise relationships between the exponents p for which nontrivial E^p functions exist and the sizes of the corners and cusps on the boundary of the domain.

SAMIR RAOUAFI, Université Laval
Pseudospectre et le comportement d'une matrice

Existe-t-il une constante $M = M(f, N)$ tel que $\|f(A)\| \leq M\|f(B)\|$, où A et B sont deux matrices de $\mathbb{C}^{N \times N}$ qui ont des pseudospectres identiques? On va prouver dans cet exposé que la réponse est "oui" si f est une transformation de Möbius, et "non" pour toute autre fonction holomorphe et non-constante.

ERIC SCHIPPERS, University of Manitoba
A functional-analytic proof of the conformal welding theorem

The conformal welding theorem states that any quasisymmetric self-map of the circle can be factored as $g^{-1} \circ f$, where f is a conformal map of the unit disk, and g is a conformal map of the exterior to the unit disk.

In this talk, I describe a new functional-analytic proof of the conformal welding theorem, which does not require the existence of solutions to the Beltrami differential equation. The proof uses Grunsky matrices and a representation of quasisymmetries as composition operators on a certain Hilbert space.

JIE XIAO, Memorial University
Composite Mappings between Analytic Campanato Spaces

This talk, based on a joint paper with W. Xu, will address characterization of the boundedness/compactness of a composition operator between any two analytic Campanato spaces on the unit complex disk.

MALIK YOUNSI, Université Laval
Computation of Analytic Capacity and applications to the Subadditivity Problem

We shall present a least-squares method for computing the analytic capacity of compact plane sets with piecewise-analytic boundary. The method furnishes rigorous upper and lower bounds which converge to the true value of the capacity. Several illustrative examples will be presented. We shall also discuss a conjecture which, if true, would imply that analytic capacity is subadditive. This is joint work with T. Ransford.

NINA ZORBOSKA, University of Manitoba
Hyperbolic derivative, distortion and composition operators on the Bloch-type spaces

The class of composition operators provides a natural connection between operator theory, complex analysis and geometry.

Using the generalized hyperbolic derivative, we will describe how the limited distortion of the inducing map relates to the Fredholm properties of the composition operator when the operator acts on the Bloch-type spaces.