

**COMPLEX ANALYSIS AND OPERATOR THEORY, VIENNA
18-19 SEPTEMBER 2014**

Alexandru Aleman *"Residual subspaces and spectral synthesis for differentiation on C^∞ "*

Abstract: If I is an interval on the real line, the differentiation operator $\frac{d}{dt}$ restricted to its invariant subspaces of $C^\infty(I)$ shows a fairly intricate behavior. The spectrum of such a restriction, may be void, or equal to the whole complex plane, or consist of a countable set of eigenvalues. Arbitrary invariant subspaces may contain a nontrivial "residual part" where the spectrum of the restriction is void. The talk is focused on two topics:

- 1) The structure of residual subspaces,
- 2) The appropriate spectral synthesis in invariant subspaces with a countable spectrum.

The material is based on earlier joint work with B. Korenblum and recent results with A. Baranov and Y. Belov.

Laura Gavruta *"Embeddings of vector-valued Bergman spaces"*

Abstract: We remark that a dyadic version of the Carleson embedding theorem for the Bergman space extends to vector-valued functions and operator-valued measures. This is in contrast to a result by Nazarov, Treil, Volberg in the context of the Hardy space. We then discuss some embeddings for analytic vector-valued functions.

Maria Jose Martin *"On the a_2 -conjecture for univalent harmonic mappings"*

Abstract: We will offer a new approach to the still unresolved problem of determining the order of the family S_H of univalent harmonic mappings defined in the unit disk. We establish a generalization of Pommerenke's result that gives the order of the family of holomorphic mappings of bounded Schwarzian norm by deriving the analogous result for harmonic mappings. Our result shows consistency between the conjectured value for the order of the class S_H and one natural candidate for being extremal for the Schwarzian norm.

This is a joint work with M. Chuaqui and R. Hernández.

Joaquim Ortega-Cerda *"Orthonormal flat polynomials in the sphere"*

Abstract: In this joint work with Jordi Marzo we construct an orthonormal system of n_k polynomials in the sphere uniformly bounded, where n_k is almost the dimension of the space of polynomials. In this construction the Fekete points in the sphere and the reproducing kernels of the space of polynomials play a key-role.

Jose Angel Pelaez *"Two weight inequality for Bergman projection"*

Let \mathbb{D} be the complex unit disc and let A_ω^p denote the Bergman space in the unit disc induced by a radial weight ω with the doubling property

$$\sup_{0 \leq r < 1} \frac{\int_r^1 \omega(s) ds}{\int_{\frac{1+r}{2}}^1 \omega(s) ds} < \infty.$$

We shall obtain a description of the L^p -means and the L_v^p -behavior of B_ζ^ω , the reproducing kernels of A_ω^2 .

Later, let us consider the Bergman projection from L_ω^2 to A_ω^2

$$P_\omega(f)(z) = \int_{\mathbb{D}} f(\zeta) B_\zeta^\omega(z) \omega(\zeta) dA(\zeta)$$

and let us study the two weight problem

$$\|P_\omega(f)\|_{L_v^p} \lesssim \|f\|_{L_\omega^p}, \quad f \in L_\omega^p.$$

Joint works with O. Constantin and J. Rättyä.

Sandra Pott *"A simple proof of Volberg's Theorem and a characterisation of p -thin sequences in the disk"*

Abstract: It is well-known that a sequence (z_j) in the disk is a Carleson sequence, if and only if the Gram matrix $G = (\langle K_{z_i}, K_{z_j} \rangle)_{i,j}$ is invertible, where the K_{z_j} denote the normalised reproducing kernels of the Hardy space H^2 on the disk. A sequence (z_j) is called thin, if $|B_j(z_j)|$ converges to 1. Here, B_n denotes the Blaschke product of the sequence $(z_j)_{j \neq n}$. Volberg showed in 1982 that (z_j) is thin, if and only if $\mathbf{1} - G$ is compact. In the talk, we will give a short proof of this theorem and moreover show that for $0 < p < \infty$, $\mathbf{1} - G$ is of Schatten class S_p if and only if $\sum_j (1 - |B_j(z_j)|)^{p/2} < \infty$.

This is joint work with Pamela Gorkin, John McCarthy and Brett Wick.

Jouni Rättyä *"Carleson embeddings for Bergman spaces via harmonic analysis"*

Abstract: Let A_ω^p denote the Bergman space in the unit disc induced by a radial weight ω with the doubling property $\int_r^1 \omega(s) ds \leq C \int_{\frac{1+r}{2}}^1 \omega(s) ds$. The positive Borel measures such that A_ω^p is continuously embedded into $L^q(\mu)$ are characterized in terms of geometric conditions when $0 < p, q < \infty$. En route to the proof tent spaces for weighted Bergman spaces are considered.

The talk is based on a joint work with José Ángel Peláez.

Maria Carmen Reguera "*Lower bounds for fractional Riesz transforms on general Cantor sets*"

Abstract: In this talk we study estimates from below for the L^2 norm of the s -dimensional Riesz transform, with kernel $x/|x|^{s+1}$ for $s \in (d-1, d)$, of measures supported on very general Cantor sets in \mathbb{R}^d . The bounds obtained are written in terms of the densities of the cubes appearing in the construction of the Cantor sets. These estimates allow to establish an equivalence between the capacity γ_s associated with the s -dimensional Riesz kernel and the capacity $\dot{C}_{\frac{2}{3}(d-s), \frac{3}{2}}$ from non-linear potential theory associated to the Wolff potential for the so called uniformly disconnected compact sets.

The comparability of the two capacities was first understood by Mateu, Prat and Verdera, who proved $\gamma_s(E) \equiv \dot{C}_{\frac{2}{3}(d-s), \frac{3}{2}}(E)$ for any compact set E in the case $0 < s < 1$. The general case is still a big open problem in Geometric analysis. Our result is the latest contribution and it is based on previous work on the subject by Eiderman-Nazarov-Volberg, Mateu-Tolsa and Tolsa.

This is joint work with Xavier Tolsa.

Dragan Vukotic "*Weighted compositions preserving the functions with positive real part*"

Abstract: In this preliminary report on a joint work with Irina Arevalo (graduate student), Rodrigo Hernandez, and Maria J. Martin, we characterize both in analytic and in geometric terms all weighted composition transformations that preserve the class of normalized analytic functions in the disk with positive real part. We analyze in detail some special cases of symbols of such transformations.