

Topics in Functional Analysis 2018

9-11th July 2018 at NUI Galway



Schedule

Mon 9th July

10:00 - 10:20	Registration	
10:20 - 10:50	Pilar Rueda	<i>Weighted spaces of Lipschitz functions</i>
10:50 - 11:20	Coffee Break	
11:20 - 12:10	Luiza Moraes	<i>On the Continuity of the Composition Operation in $\mathcal{H}_b(E, E)$</i>
12:10 - 13:00	Barry Turett	<i>Renormings of classical Banach spaces in metric fixed point theory</i>
13:00 - 14:00	Lunch	
14:00 - 14:30	Yun Sung Choi	<i>$\sigma_a(D) - \sigma_\mu(D)$ for a general Dirichlet series D</i>
14:30 - 15:00	Clifford Gilmore	<i>Dynamics of Derivations</i>
15:00 - 15:30	Sun Kwang Kim	<i>The Bishop-Phelps-Bollobas point property</i>
15:30 - 16:00	Coffee Break	
16:00 - 16:30	Anna Kaminska	<i>Banach envelopes</i>
16:30 - 17:00	Tatsuhiro Honda	<i>Bloch functions on the homogeneous unit ball in a complex Banach space</i>

Tue 10th July

10:00 - 10:50	Mikael Lindström	<i>Volterra operators mapping between Banach spaces of analytic functions</i>
10:50 - 11:20	Coffee Break	
11:20 - 12:10	Pablo Galindo	<i>Interpolating sequences for weighted spaces of analytic functions on the unit Ball of a Hilbert space</i>
12:10 - 13:00	Sean Dineen	<i>A polynomial miscellany</i>
13:00 - 14:00	Lunch	
14:00 - 14:50	Dirk Werner	<i>Equivalent norms with an extremely nonlineable set of norm attaining functionals</i>
14:50 - 15:20	Milena Venkova	<i>Polynomials on Tree Spaces</i>
15:20 - 15:50	Han Ju Lee	<i>On the pointwise Bishop-Phelps-Bollobas property</i>
15:50 - 16:30	Coffee Break	
16:30 - 17:30	— —	<i>Special Session</i>

Wed 11th July

09:30 - 10:20	Richard Aron	<i>Gleason parts on various disc algebras</i>
10:20 - 11:10	Padraig Kirwan	<i>20 years of Extendibility of Homogeneous Polynomials</i>
11:10 - 11:40	Coffee Break	
11:40 - 12:10	Anthony Brown	<i>Non-homogeneous tensor products and norms of projections between spaces of polynomials</i>
12:10 - 13:00	Ignacio Zalduendo	<i>On the measure of polynomials attaining local maxima on a vertex</i>
13:00 - 14:00	Lunch	

Abstracts

Richard Aron

(Kent State University)

Wed 11th July 09:30–10:20

Gleason parts on various disc algebras

This is a preliminary report describing some ongoing work with Verónica Dimant, Manuel Maestre, and Silvia Lassalle. We will begin with a review of Gleason parts on Banach algebras. We will next recall the description of Gleason parts for the maximal ideal space of the disc algebra $A(\mathbb{D})$ and of the multidisc algebra $A(\mathbb{D}^n)$. We conclude with some remarks about Gleason parts for the maximal ideal space of the easiest (but still not so easy) infinite dimensional counterpart, $A_u(B_{c_0})$.

Anthony Brown

(UCD)

Wed 11th July 11:40–12:10

Non-homogeneous tensor products and norms of projections between spaces of polynomials

We will introduce the concept of a non-homogeneous symmetric tensor product along with an associated norm, which plays the role of the projective norm on an ordinary tensor product.

With the aid of a duality result, we will use this norm to answer questions about projection mappings between spaces of non-homogeneous polynomials.

We will show that Chebyshev polynomials play a large part in approximately two thirds of the cases. However, the question remains open in the remaining third of cases, and we will show that in these cases, the projection norm does not have to be an integer, indicating that a different type of polynomial is needed.

Yun Sung Choi

(POSTECH)

Mon 9th July 14:00–14:30

$\sigma_a(D) - \sigma_\mu(D)$ for a general Dirichlet series D

Sean Dineen

(UCD)

Tue 10th July 12:10–13:00

A polynomial miscellany

Pablo Galindo

(Universidad de Valencia)

Tue 10th July 11:20–12:10

Interpolating sequences for weighted spaces of analytic functions on the unit Ball of a Hilbert space

For a complex Hilbert space E of arbitrary dimension, its open unit ball B_E and a *weight*, that is, a continuous positive function $\nu : B_E \rightarrow (0, \infty)$, the weighted space of analytic functions

$$H_v^\infty(B_E) := \{f : B_E \rightarrow \mathbb{C} : f \text{ is analytic and } \|f\|_v = \sup_{x \in B_E} \nu(x)|f(x)| < \infty\}$$

is a Banach space when endowed with the $\|\cdot\|_v$ norm. Interpolating sequences for such spaces are the subject of this talk. They are hyperbolically separated. In the case of the so-called standard weights, i. e. $\nu_\alpha(x) = (1 - \|x\|^2)^\alpha$, $\alpha \geq 0$, a sufficient condition for a sequence to be linear interpolating is given in terms of Carleson type measures. The results apply to the space of Bloch functions of such unit ball.

Based on joint work with Oscar Blasco, Mikael Lindström and Alejandro Miralles.

Clifford Gilmore

(University of Manchester)

Mon 9th July 14:30–15:00

Dynamics of Derivations

We examine the hypercyclicity of generalised derivations $S \mapsto AS - SB$, for fixed bounded linear operators A, B , on spaces of operators. Hitherto the principal result in this setting has been the characterisation of the hypercyclicity of the left and right multiplication operators by Bonet, Martínez-Giménez and Peris [1].

The main example I will show is the existence of non-trivial hypercyclic generalised derivations on separable ideals of operators [2]. I will also outline joint work with Saksman and Tylli [3], which gives the somewhat surprising result that scalar multiples of the backward shift operator cB never induce hypercyclic commutator maps $S \mapsto c(BS - SB)$ on separable ideals of operators on ℓ^2 .

[1] J. Bonet, F. Martínez-Giménez, and A. Peris. Universal and chaotic multipliers on spaces of operators. *J. Math. Anal. Appl.*, 297(2):599–611, 2004.

[2] C. Gilmore. Dynamics of generalised derivations and elementary operators. *Complex Anal. Oper. Theory*, in press, 2018. DOI: 10.1007/s11785-018-0774-9.

[3] C. Gilmore, E. Saksman, and H.-O. Tylli. Hypercyclicity properties of commutator maps. *Integr. Equ. Oper. Theory*, 87(1):139–155, 2017.

Tatsuhiro Honda

(Senshu University, Japan)

Mon 9th July 16:30–17:00

Bloch functions on the homogeneous unit ball in a complex Banach space

There are many equivalent conditions for Bloch functions on the unit disc $\mathbb{U} = \{\zeta \in \mathbb{C} : |\zeta| < 1\}$. Then, the concept of a Bloch function has been extended to various complex domains in finite or infinite dimensions. In particular, it has been extended by Hahn and Timoney to bounded homogeneous domains in \mathbb{C}^n , and to infinite dimensional Hilbert balls by Blasco, Galindo and Miralles.

In this talk, we introduce the concept of a Bloch function to the homogeneous unit ball in a complex Banach space. This enables us to extend a number of results concerning Bloch functions on \mathbb{U} to bounded symmetric domains in a complex Banach space.

[Reference] C.-H. Chu, H. Hamada, T. Honda and G. Kohr, Bloch functions on bounded symmetric domains, J. fuct. Anal. 272 (2017), 2412 – 2441.

Anna Kaminska

(University of Memphis, Memphis, USA)

Mon 9th July 16:00–16:30

Banach envelopes

The *Mackey topology* τ of a locally bounded space X with separating dual is the strongest locally convex topology on X which is weaker than the original one. The Minkowski functional of the set $\overline{\text{co}}(B)$ is called the *Mackey norm* on X . The completion of the space (X, τ) is called the Mackey completion of X and is denoted by \widehat{X} . \widehat{X} equipped with the Mackey norm $\|\cdot\|_{\widehat{X}}$ is also called a Banach envelope of X . There are several equivalent formulas for the Mackey norm, for instance, for any $x \in \widehat{X}$,

$$\|x\|_{\widehat{X}} = \inf \left\{ \sum_{i=1}^n \|x_i\|_X : \sum_{i=1}^n x_i = x \right\}.$$

We will give several examples of function or sequence quasi-Banach spaces and their Banach envelopes. In particular weak ℓ_p , $0 < p \leq 1$, weak L_1 spaces (called Marcinkiewicz spaces), Orlicz and Orlicz-Lorentz spaces induced by increasing functions (not convex), Ceàro weighted sequence and function spaces corresponding to the exponent $0 < p < 1$.

Sun Kwang Kim

(Chungbuk University)

Mon 9th July 15:00–15:30

The Bishop-Phelps-Bollobas point property

Padraig Kirwan

(Waterford Institute of Technology)

Wed 11th July 10:20–11:10

20 years of Extendibility of Homogeneous Polynomials

Han Ju Lee

(Dongguk Univeristy)

Tue 10th July 15:20–15:50

On the pointwise Bishop-Phelps-Bollobas property

Mikael Lindström

(Abo Akademi University)

Tue 10th July 10:00–10:50

Volterra operators mapping between Banach spaces of analytic functions

I will discuss boundedness and compactness of the classical Volterra operator $T_g: H_{v_\alpha}^\infty \rightarrow H^\infty$ induced by a univalent function g for standard weights v_α with $0 \leq \alpha < 1$. Moreover, I will consider boundedness, compactness and weak compactness of the generalized Volterra operator T_g^φ mapping between Banach spaces of analytic functions on the unit disc satisfying certain general conditions.

Luiza Moraes

(Universidade Federal do Rio de Janeiro (UFRJ))

Mon 9th July 11:20–12:10

On the Continuity of the Composition Operation in $\mathcal{H}_b(E, E)$

Let E be a complex Banach space. As usual, $\mathcal{H}_b(E, E)$ denotes the Fréchet space of holomorphic mappings from E into E which are bounded on the bounded subsets of E endowed with the topology τ_b of uniform convergence on bounded subsets of E . We prove the continuity of the *composition* operation $(f, g) \rightarrow f \circ g$ on $\mathcal{H}_b(E, E)$ and we show that in this case the composition operation turns to be even holomorphic. Borrowing the notion of ideal in the algebra $\mathcal{L}(E)$ of bounded linear operators on E we study its analogue in $\mathcal{H}_b(E, E)$ by considering linear subspaces closed under left and right composition, that we call ideals as well.

The results presented in this talk are part of a joint work with Maria D. Acosta, from the Universidad de Granada (Spain) and Pablo Galindo, from the Universidad de Valencia (Spain).

REFERENCE

M.D. Acosta, P. Galindo and L.A. Moraes, On the continuity of the composition operation for spaces of holomorphic mappings, pre-print.

Pilar Rueda

(Universitat de València)

Mon 9th July 10:20–10:50

Weighted spaces of Lipschitz functions

The study of the isomorphic structure of spaces of Lipschitz functions has aroused the interest of many mathematicians. We will quote some results by Bonic, Frampton, Kalton, Tromba, Weaver or Wulbert, on the isomorphic and isometric representations of Lipschitz and Hölder type spaces. Our aim is to contribute to a better knowledge of the isometric representations of the Hölder type space $lip_0^{(\alpha)}(X)$ ($0 < \alpha < 1$). For instance, we will show that this space is not isometrically isomorphic to a subspace of c_0 whenever X is a \mathbb{T} -balanced subset containing 0 and compact for some metrizable topology of a complex Banach space. In particular, we show that $lip_0^{(\alpha)}(\mathbb{T} \cup \{0\})$ and $lip_0^{(\alpha)}(\mathbb{D})$ are not isometrically isomorphic to subspaces of c_0 . In fact, we will show much more general results in the context of weighted Banach spaces of Lipschitz functions. This talk is based in a joint work with Antonio Jiménez-Vargas.

Barry Turett

(Rochester, Michigan)

Mon 9th July 12:10–13:00

Renormings of classical Banach spaces in metric fixed point theory

Renormings of classical Banach spaces have led to significant results in metric fixed point theory. In this talk, a survey of some of these results and techniques will be discussed. In particular, we will look at how James's distortion theorems have contributed to this field.

Milena Venkova

(Dublin Institute of Technology)

Tue 10th July 14:50–15:20

Polynomials on Tree Spaces

It is well known that if E is a Banach space which has the Dunford-Pettis Property and does not contain a copy of ℓ_1 , then every continuous polynomial on E is weakly continuous on bounded sets, i.e. $\mathcal{P}_w(^nE)$ and $\mathcal{P}(^nE)$ coincide for all n . On the other hand, if E is an Asplund space we know that every integral polynomial on E is nuclear, $\mathcal{P}_I(^nE) = \mathcal{P}_N(^nE)$.

In this talk we consider a “new” class of spaces, called tree spaces, and their preduals. In this forest we find examples of non-Asplund spaces where $\mathcal{P}_I(^nE) = \mathcal{P}_N(^nE)$, and spaces without DPP but such that $\mathcal{P}_w(^nE) = \mathcal{P}(^nE)$. In particular, we exhibit a new example of a Q-reflexive Banach space.

Dirk Werner

(FU Berlin)

Tue 10th July 14:00–14:50

Equivalent norms with an extremely nonlinear set of norm attaining functionals

The talk addresses the question of whether the set of norm attaining functionals on a Banach space, which is always dense by the Bishop-Phelps theorem, contains a linear subspace. The results are joint work with V. Kadets, M. Martín, and G. López Pérez.

Ignacio Zalduendo

(Universidad Torcuato Di Tella)

Wed 11th July 12:10–13:00

On the measure of polynomials attaining local maxima on a vertex

We calculate the probability that a k -homogeneous polynomial in n variables attain a local maximum on a vertex in terms of the "sharpness" of the vertex, and then study the dependence of this measure on the growth of dimension and degree. We find that the behavior of vertices with orthogonal edges is markedly different to that of sharper vertices. If the degree k grows with the dimension n , the probability that a polynomial attains a local maximum tends to $1/2$, but for orthogonal edges the growth-rate of k must be larger than $n \ln n$, while for sharper vertices a growth-rate larger than $\ln n$ will suffice.

This is joint work with Damián Pinasco.

Participants

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