Short talks

Special Session on Numerical Functional Analysis: 08-08-10 3.30pm

1. Rafikul Alam
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Indian Institute of Technology Guwahati, Guwahati, INDIA
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Title: Sensitivity and perturbation analysis of nonlinear eigenvalue

Abstract: We discuss a general framework for sensitivity and perturbation analysis of nonlinear eigenvalue problem. More specifically, we discuss first order variations of simple eigenvalues of polynomial/holomorphic and rational matrix functions, determine their gradients and present a general definition of condition number of a simple eigenvalue. We show that our treatment unifies various condition numbers of simple eigenvalues of matrix pencils and matrix polynomials proposed in the literature. We present an alternative expression of condition number of a simple eigenvalue that does not involve left and right eigenvectors associated with the eigenvalue. We show that the sensitivity of a simple eigenvalue is inversely proportional to the absolute value of the derivative of the characteristic polynomial at the eigenvalue. We also construct fast perturbations for moving simple eigenvalues.

2. Laurence Grammont
LAMUSE, University of St-Etienne, St-Etienne, FRANCE
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Title: Linearization versus discretization

Abstract: For a nonlinear operator equation, we can first apply a process of linearization such as a Newton type method, and then discretize the obtained iterations. We have also the possibility to discretize the nonlinear equation with a method such as a quadrature method or a projection method, and then apply a Newton type method to the discretized equation. The question that we deal with is the following: Which to start with: Linearization or discretization?

3. Rekha P. Kulkarni
Department of Mathematics, Indian Institute of Technology Bombay, Mumbai, INDIA
email: rpk@math.iitb.ac.in

Title: Asymptotic Error Expansions for Approximate Solution of Second Kind Integral Equations

Abstract: We consider a numerical solution of a second kind Fredholm integral equation with a continuous kernel. The integral operator is replaced by a finite rank Nystrom operator obtained by replacing the integral by a numerical quadrature rule. In the case of a smooth kernel, we discuss the well-known asymptotic expansions for the error. We then extend these results to the case of a continuous kernel which is of the type of a Green's function.

4. Prof. A.S. Vasudeva Murthy
TIFR-Centre for Applicable Mathematics, Bangalore, INDIA
Email: vasu@math.tifrbng.res.in

Title: Operator splitting methods for numerical solution of partial differential equations

Abstract: Given a first order in time evolutionary partial differential equation (ftepde) one could split this ftepde into two or more ftepde's each of which can be solved more conveniently than the original system. The individual solutions (exact or numerical) are then combined in such a way to approximate the original ftepde. We discuss this technique for the Schrodinger equation using the Trotter product formula.

5. Prof. M. Thamban Nair
Department of Mathematics, Indian Institute of Technology Madras, Chennai, INDIA
Email: mtnair@iitm.ac.in

Title: A quadrature based regularization method for ill-posed integral equations

Abstract: Nystrom method is a well-known numerical procedure for obtaining approximate solutions for second-kind integral equations. As Tikhonov

regularization of ill-posed integral equations lead to a family of second-kind integral equations, it would be natural to apply Nystrom method for such equations. However, the error analysis requires careful investigation on the role of parameter choice and the type of a priori smoothness conditions on the unknown solution. These aspects will be dealt in the talk.

6. Prof. Mythily Ramaswamy
TIFR-Centre for Applicable Mathematics, Bangalore, INDIA
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Title: Optimal control problem for Burger's equation

Abstract: An optimal control problem formulation of a data assimilation problem involving Burger's equation will be discussed. Functional analytic set up required for the numerical resolution of the problem as well as some numerical results will be discussed.

7) Balmohan V. Limaye
Department of Mathematics,
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Title: Canonical Discretization of some operators of infinite rank

Abstract: Every finite rank bounded operator on a Banach space is the composition of a bounded operator from the Banach space to a finite dimensional Euclidean space and of an operator from that Euclidean space to the Banach space. A cannonical discretization of such a finite rank bounded operator on a Banach space is well-known. We shall give a canonical discretization of a bounded operator on a Banach space which is the sum of a bounded operator of finite rank and another bounded operator which in some sense 'commutes' with one of the factors of the finite rank operator mentioned in the beginning. This discretization enables us to reduce the solution of operator equations of the second kind and of the eigenvalue problems for this kind of operators to matrix computations. Operators used in approximation of an integral operator with a weakly singular kernel by the singulatity subtraction technique form a special case.

Special session on Operator Theory: 09-08-10 3.30pm

1) Manjul Gupta
Department of Mathematics
Indian Institute of Technology, Kanpur

Title: On Ideals of Orlicz Type Operators

Abstract In this talk we shall consider the vector space $l_M(X,Y)$ of all linear operators acting between Banach spaces X and Y such that the sequence of approximation numbers of these operators belong to the Orlicz sequence space l_M. We also consider the subspace $S_M(X,Y)$ of $l_M(X,Y)$, which corresponds to the class of M? rapidly decreasing sequences. It is shown that the collection of such linear operators between arbitrary Banach spaces forms an operator ideal.

2) J O Olaleru
Department of Mathematics, University of Lagos,
Yaba, Lagos, Nigeria
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Title: Common fixed points for a rational inequality under weakly compatible maps in cone metric spaces.

Abstract: Huang and Zhang [1] recently introduced the cone metric spaces by replacing real numbers with ordered Banach spaces and Olaleru [5] later generalized the concept by replacing ordered Banach spaces with ordered topological vector spaces. The interest in cone metric spaces is informed by their recently discovered applications in optimization theory. For example, see [3]. Several fixed point theorems are recently proved for different contractive operators on cone metric spaces. For example, see [5] and [2].

In this paper, we present common fixed point results for a rational inequality of weakly compatible maps in cone metric spaces.

The results are generalizations and extensions of several fixed point results in cone metric spaces and consequently in metric spaces including the recent results in [4].

References

[1] L.G. Huang and X.Zhang, *Cone metric spaces*, **332**, no 2(2007),1468-1476.

[2] G.Jungck, S.Radojevic and V.Rakocevic, *Common fixed point theorems of weakly compatible pairs on cone metric spaces*, Fixed Point Theory and Applications,**vol.2009** Article ID 643840,13 pages, 2009.

[3] H.Mohebi, *Topical functions and their properties in a class of ordered Banach spaces*, in Continuous Optimization, Current Trends and Applications, **99**, pp343-361, Springer, New York, NY.

[4] P. P. Murthy and J. O. Olaleru, *Common fixed points for a rational inequality under weak compatible maps of type (A)*, East Asia Math. Jour., **25**, no.1, 89-96.

[5] J. O. Olaleru, *Some generalizations of fixed point theorems in cone metric spaces*, Fixed Point Theory and Applications,**vol.2010**, Article ID 643840,10 pages, 2010.

3) M Amini
Department of Mathematics
Tarbiat Modaras University, Tehran

Title: Module operator amenability of Fourier algebras on inverse semigroups Presented by: Massoud Amini (joint work with R. Rezavand)

Abstract: We define module operator amenability for Banach algebras which are operator Banach modules over a C^*-algebra with compatible actions and study the module operator amenability of the Fourier algebra $A(S)$ of an inverse semigroup S with set of idempotents E, as a module on the semigroup full C^*-algebra $C^*(E)$. It is shown that the module operator amenability of $A(S)$ is equivalent to the amenability of S.

4) Daniel Li
Université d'Artois (France)

Title: Compact composition operators on Hardy-Orlicz and Bergman-Orlicz spaces *Joint work with P. Lefèvre, H. Queffélec and L. Rodríguez-Piazza*

Abstract: It is known, from results of B. McCluer and J. Shapiro (1986), that every composition operator which is compact on the Hardy space H^p, $1 \leq p < \infty$, is also compact on the Bergman space $B^p = L^2_a(\mathbb{D})$. In this talk, we consider Hardy-Orlicz H^Ψ and Bergman-Orlicz B^Ψ spaces, characterize the compactness of their composition operators, and show that there exist Orlicz functions for which there are composition operators which are compact on H^Ψ but not on B^Ψ.

5) U Mishra
Department of Pure & Applied Mathematics
Guru Ghasidas Vishwavidyalaya,
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Title: Fixed Point Theorem in Non-Archimedean Menger PM-Spaces

Abstract: In this paper, we introduce semi-compatible maps and reciprocal continuous maps in non-Archimedean PM-space and establish a common fixed point theorem for such mappings. Moreover, we show that in the context of reciprocal continuity, the notion of compatibility and semi-compatibility of maps becomes equivalent. Our result generalizes several fixed point theorems in the sense that all maps involved in the theorems are discontinuous even at common fixed point.

6) A. Khosravi
Department of Mathematics
Tarbiat Moallem University, Tehran

Title: Sums of Fusion frames, Operator-valued frames and g-frames

Abstract: Frames in Hilbert spaces introduced by Duffin and Schaeffer in 1952, Gabor frames introduced in 1946. It has many generalizations, e.g. oblique frames, pseudo-frames, fusion frames, g-frames and so on. Meanwhile Frank and Larson introduced frames in Hilbert C^*-modules. Later Casazza

et al investigated the sum of frames in Hilbert spaces. In this paper we generalize their results to sums of fusion frames and g-frames in Hilbert spaces. We also generalize their results to frames, fusion frames, g-frames and operator-valued frames in Hilbert C^*-modules.

Special session on Geometry of Banach spaces: 10-08-10 3.30pm

1) C. Zanco
Department of Mathematics
Universita degli Studi, Milan

Title: On a question by Corson about point-finite coverings

Abstract: We answer in the affirmative the following question raised by H. H. Corson in 1961: "Is it possible to cover every Banach space X by bounded convex sets with nonempty interior in such a way that no point of X belongs to infinitely many of them?"

Actually we show the way to produce in every Banach space X a bounded convex tiling of order 2, i.e. a covering of X by bounded convex closed sets with nonempty interior (tiles) such that the interiors are pairwise disjoint and no point of X belongs to more than two tiles.

2000 Mathematics Subject Classification: 46B20, 52A45.

2) E.A. Sánchez Pérez
Instituto de Matemática Pura y Aplicada (I.M.P.A.-U.P.V.).
Universidad Politécnica de Valencia.
Camino de Vera s/n, 46022 Valencia (Spain).

Title: Geometric properties of Banach function spaces of vector measure p-integrable functions

Abstract: Let (Ω, Σ) be a measurable space, X a Banach space and $m : \Sigma \to X$ a vector measure. Let $1 \leq p < \infty$, and consider the space $L^p(m)$ of p-integrable functions with respect to m. It is well known that these spaces are order continuous p-convex Banach function spaces with respect to μ, where μ is a Rybakov measure for m. In fact, each Banach lattice having these properties can be written (order isomorphically) as an $L^p(m)$ space for

a positive vector measure m [2]. In this talk we explain further geometric properties of these spaces, their subspaces and the seminorms that define the weak topology on $L^p(m)$. The main applications that are shown are related to the factorization and extension theory of operators in these spaces [1, 2]. Concrete examples and applications to Harmonic Analysis are also given. [1]

References

[1] A. Defant and E.A. Sanchez Perez, *Domination of operators on Banach function spaces*. Math. Proc. Cambridge P. Soc., 146, 57-66(2009).

[2] S. Okada, W. J. Ricker and E. A. Sánchez-Pérez, *Optimal domain and integral extension of operators —Acting in function spaces—*, Operator Theory: Advances and Applications, vol. 180, Birkhäuser Verlag, Basel, 2008.

3) David Yost
University of Ballarat

Title: Quasi-Banach spaces, M-ideals and polyhedra

Abstract: Three-space problems and extensions of Banach spaces lead naturally to the study of quasi-linear mappings between quasi-Banach spaces. We define a more restricted class of mappings which keeps us within the class of Banach spaces. More precisely, a mapping between Banach spaces is called pseudolinear if it is homogeneous and its linearity gap is bounded by the gap in the triangle inequality. The twisted sums which arise then turn out to be semi-L-summands. Applying the dual concept of semi-M-ideals leads us to some interesting results about best approximant sets and Minkowski decomposability of balls in certain Banach spaces. The special case of finite dimensional spaces whose unit balls are polytopes then becomes a theorem about polytopes. Once stated, this result can be proved geometrically, but its inadvertent discovery required a lot of functional analysis.

[1]The research was supported by Ministerio de Ciencia e Innovación (Spain) under project MTM2009-14483-C02-02.

4) N Namboodiri
Department of Mathematics
Cochin University of Science & Technology, Cochin

Title: 'Geometric Formulation Of Non Commutative Korovkin Sets'

Abstract: This talk is based on article by Prof.Limaye and myself that appeared in J.Approx theory [1984] and the Geometric Theory Of Korovkin sets for commutative case due to H.Berens and GG Lorentz [1975].Berens formulation is based on Choquet boundary.So it is aimed at developing the non commutative analogue using W.Arveson's 'Non CommutativeChoque Boundary' [2007]and Shilov boundary.

5) B Krishna Reddy
Dept.of Mathematics,
Univ.College of Science, Osmania Univ., Hyderabad

Title: On equivalence of n-norms in a linear n-normed space

Abstract: Some necessary and sufficient conditions for n-norms to be equivalent on a linear n-normed space are given and some properties of linear n-normed spaces are explored and obtained. Keywords: Linear n-normed space, equivalence of n-norms. 2000 subject classification : 46B20 1.INTRODUCTION: The defining properties of normed linear spaces are well-known and many important and useful results have been derived for these spaces. However, in certain application involving vector spaces these properties are not, appropriate, and another type of norm referred to as 2 - norm, in general n -norm is more useful. In 1965, the concept of linear 2-normed space was introduced by S. Gahlar [3] and he has investigated many important properties and examples for the above space. Subsequently, Freese.R, and Cho.,[2] proved that every linear 2-normed space of dimension 2 is a 2-Banach space, when the underlying field is complete. In this paper, some properties and some results of linear n-normed spaces are explored and obtained some necessary and sufficient conditions for n-norms to be equivalent on an n-normed space.

Special session on Function spaces. 11-08-10 3.30pm

1) L M Tovar

Department of Mathematics
ESFM, Mexico City

Title: A New Kind of Complex Function Bergman Classes with

Abstract: We deal with a new kind of weighted function classes by modifying the $F(p, q, s)$ spaces introduced by Zhao by a meas We prove its basic properties and relationships with several weighted function classes.

Keywords: Bloch Spaces, $B^{(\alpha)}$ spaces, Bergman spa $F(p, q, s)$ spaces.

2) Sanjay Kumar
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Title: Weighted Composition Operators Between Spaces of Dirichlet Type

Abstract: Let $\mathbb{D}$ denote the open unit disk in the complex plane $\mathbb{C}$. We will use the notation $H(\mathbb{D})$ for the space of complex valued holomorphic functions on the open unit disk $\mathbf{D}$. Let $\varphi, \psi \in H(\mathbb{D})$ be such that $\varphi(\mathbb{D}) \subseteq \mathbb{D}$. Then the weighted composition operator $W_{\varphi,\psi}$ acting on $H(\mathbb{D})$ is defined as

$$W_{\varphi,\psi}(f)(z) = \psi(z) f(\varphi(z)).$$

When $\psi \equiv 1$, we just have the composition operator C_φ, defined by

$$C_\varphi(f) = f \circ \varphi.$$

Also if $\varphi \equiv I$, the identity function, then we get the multiplication operator M_ψ defined by $M_\psi(f)(z) = \psi(z) f(z)$. Let $dA(z) = \frac{1}{\pi} dxdy$ denote the normalized Lebesgue area measure on $\mathbf{D}$. Also, let $dA_\alpha(z) = (1+\alpha)\,(1-|z|^2)^\alpha\, dA(z)$ denote the weighted Lebesgue area measure on $\mathbf{D}$. For $0 < p < \infty$ and $-1 < \alpha < \infty$, the spaces of Dirichlet type $\mathcal{D}^p_\alpha$ consist of those functions f holomorphic on $\mathbf{D}$ such that

$$\|f\|_{\mathcal{D}^p_\alpha} = \left(|f(0)|^p + \int_{\mathbb{D}} |f'(z)|^p dA_\alpha(z) \right)^{1/p} < \infty.$$

In this work we characterize the boundedness and the compactness of weighted composition operators acting between Dirichlet type spaces by using Carleson measures. We also find the essential norm estimates for these operators.

3) Sushil Shukla

Title: On specific curvature tensors of quasi-Einstein almost hyperbolic Hermitian manifold

Abstract: Object of present paper is to study properties of specific curvature tensors quasi-Einstein almost hyperbolic Hermitian manifold.

4) Ajay K. Sharma
School of Mathematics
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Title: Generalized Weighted Composition Operators between Hardy and Weighted Bergman Spaces

Abstract: For $0 < p < \infty$, the Hardy space $\mathcal{H}^p$ is the space of functions f that are holomorphic on the open unit disk $\mathbb{D}$ and satisfy

$$||f||_{\mathcal{H}^p} = \sup_{0 \le r < 1} \frac{1}{2\pi} \int_0^{2\pi} |f(re^{i\theta})|^p d\theta < \infty.$$

Let $dA(z) = \frac{1}{\pi} dxdy = \frac{1}{\pi} r dr d\theta$, where $z = x + iy$, denote the normalized area measure on $\mathbb{D}$. For each $\alpha \in (-1, \infty)$, we set

$$dA_\alpha(z) = (\alpha + 1)[\log(1/|z|)]^\alpha dA(z), \ z \in \mathbb{D}.$$

For $0 < p < \infty$ and $\alpha \in (-1, \infty)$, let $\mathcal{L}^p_\alpha$ be the weighted Lebesgue space which contains measurable functions f on $\mathbb{D}$ such that $\int_{\mathbb{D}} |f(z)|^p dA_\alpha(z) < \infty$. Also denote by $\mathcal{A}^p_\alpha = \mathcal{L}^p_\alpha \cap H(\mathbb{D})$ the weighted Bergman space with the norm defined as

$$||f||_{\mathcal{A}^p_\alpha} = \Big(\int_{\mathbb{D}} |f(z)|^p dA_\alpha(z) \Big)^{1/p} < \infty.$$

Let φ and ψ be holomorphic maps on the open unit disk $\mathbb{D}$ such that $\varphi(\mathbb{D}) \subset \mathbb{D}$ and $H(\mathbb{D})$ be the space of holomorphic functions on $\mathbb{D}$.

For a non-negative integer n, define a linear operator $D^n_{\varphi,\psi}$ as $D^n_{\varphi,\psi} f = \psi \cdot (f^{(n)} \circ \varphi),\ f \in H(\mathbb{D})$, where $f^{(n)}$ denotes the n-th derivative of f. In this paper, we characterize boundedness and compactness of $D^n_{\varphi,\psi}$ between Hardy and weighted Bergman spaces. We also compute the essential norms of $D^n_{\varphi,\psi}$ acting between these spaces.

5) M.A. Sofi
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Title: Lineability issues involving vector-valued measurable and integrable functions

Abstract: We construct, over many Banach spaces, infinite dimensional vector spaces of scalarly measurable functions that are not strongly measurable and infinite dimensional vector spaces of weak*-scalarly measurable functions that are not scalarly measurable. A similar result has also been proved for the set of McShane-integrable functions which are not Bochner-integrable. This is part of the joint work carried out with F.J.G. Pacheco.