Exact solutions of a nonlinear partial differential equation with beta derivative via two analytical approaches

Volkan Ala

Mersin University, Science and Letters Faculty, Mathematics Department, Mersin, Turkey
volkanala@mersin.edu.tr

Abstract

This work is based on constructing the new exact solutions of space-time fractional nonlinear partial differential equation in beta derivative sense using two different methods. Considered equation has a significant role in plasma physics and fluid dynamics. The new extended direct algebraic method and the modified solver technique are utilized to obtain the solutions of considered equation. For detailed physical dynamical representation of the obtained solutions, 2D- and 3D- figures of the exact solutions are plotted using software.

MSC 2010: 35C08, 34K20, 32W50. .
Keywords: Beta-derivative, exact solutions, the modified solver technique

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[2] Dai C. Q, Zhang J. F., Jacobian elliptic function method for nonlinear differential-diference equations, Chaos Solitons Fractals, 27, 4, (2006).
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Saturday 18:30-19:00

Homomorphisms of Fourier algebras, part I

Michalis Anousis

University of the Aegean
mano@aegean.gr

Abstract

The Fourier algebra $A(G)$ and the Fourier-Stieltjes algebra $B(G)$ of a locally compact group G were introduced by Eymard [1964]. If G is abelian, $A(G)$ and $B(G)$ can be identified, via the Fourier transform, with $L^1(\widehat{G})$ and the measure algebra $M(\widehat{G})$ of the dual group $\widehat{G}$, respectively. Cohen [1960] characterized the homomorphisms from $A(H)$ into $B(G)$ for H and G locally compact abelian groups using a characterization of idempotents in $B(G)$. Homomorphisms of Fourier algebras for general locally compact groups were studied by Ilie-Spronk [2005] and Daws [2022].

We provide necessary and sufficient conditions for the existence of idempotents of arbitrarily large norm in the Fourier algebra $A(G)$ and the Fourier-Stieltjes algebra $B(G)$ of a locally compact group G. We prove that the existence of idempotents of arbitrarily

large norm in $B(G)$ implies the existence of homomorphisms of arbitrarily large norm from $A(H)$ into $B(G)$ for every locally compact group H.

This is a report of joint work with G. K. Eleftherakis and A. Katavolos

Saturday 10:00-10:30

The Stefan Problem

Ioannis Athanasopoulos

University of Crete
athan@uoc.gr

Abstract

The Stefan problem is the one of the simplest free boundary problem of evolution type. It is in the center of attention for more than a hundred years. Despite of its simplicity it's still incomplete even in its most basic form. We focus our attention to the local regularity of its solution (temperature) as well as to the smoothness of its free boundary (inter-phase).

Saturday 11:30-12:30

Semigroups of holomorphic functions

Dimitrios Betsakos

Aristotle University of Thessaloniki
betsakos@math.auth.gr

Abstract

A continuous semigroup of holomorphic functions on the unit disk $\mathbb{D}$ is a one-parameter family of holomorphic functions $\phi_t : \mathbb{D} \to \mathbb{D}$, $t \geq 0$, depending continuously on t and having the properties $\phi_0 = \mathrm{id}$ and $\phi_t \circ \phi_s = \phi_{s+t}$. If $z \in \mathbb{D}$, the orbit of the semigroup $(\phi_t)_{t\geq 0}$ starting from z is the curve $\gamma_z : [0, \infty) \to \mathbb{D}$ with $\gamma_z(t) = \phi_t(z)$, $t \geq 0$. We will review the basic properties of such semigroups, including their asymptotic behaviour as $t \to \infty$. We will also present some recent results on the geometric and dynamical behaviour of the orbits. The basic tools in the proofs of these results are the hyperbolic geometry of the disk and the harmonic measure.

Saturday 15:30-16:30

On a Rademacher-Gaussian tail comparison

Giorgios Chasapis

University of Crete
gchasapis@uoc.gr

Abstract

Let $\varepsilon_1, \varepsilon_2, \dots$ be independent Rademacher random variables and $g_1, g_2, \dots$ be independent standard Gaussian random variables. Pinelis has proved that there is an absolute constant $C > 0$ such that for every $n \in \mathbb{N}$, real numbers $a_1, \dots, a_n$ and any $t > 0$,

$$\mathbb{P}\left(\left|\sum_{j=1}^{n} \varepsilon_j a_j\right| \geqslant t\right) \leqslant C \cdot \mathbb{P}\left(\left|\sum_{j=1}^{n} g_j a_j\right| \geqslant t\right).$$

We generalise this Rademacher-Gaussian tail comparison to the case of complex coefficients and discuss related open problems. Based on joint work with R. Liu and T. Tkocz.

Saturday 12:30-13:00

Operator system coproducts in Quantum Information Theory

Alexandros Chatzinikolaou

National and Kapodistrian University of Athens
alexandros55c@gmail.com

Abstract

In the past few years, there has been a growing interest in Quantum Information theory, even more so after the advances in the sets of no-signalling correlations in the Alice and Bob communication scenarios. In this talk I will survey on the sets of correlations, from quantum measurements to Tsirelson's problem and Kirchberg's conjecture and their resolution, highlighting the role of operator systems and their related constructions, e.g. coproducts. Finally, I discuss a generalised version of operator systems, namely operator $\mathcal{A}$-systems, and their coproducts, based on my recent work.

Sunday 11:30-12:00

Συναρτησιακά οριακά θεωρήματα για την κάλπη *Polya*

Dimitris Cheliotis

National and Kapodistrian University of Athens
dcheliotis@math.uoa.gr

Abstract

Για την κάλπη του *Polya* με δύο χρώματα, μαύρο και άσπρο, αποδεικνύουμε ένα συναρτησιακό κεντρικό οριακό θεώρημα για τον αριθμό των άσπρων σφαιριδίων υποθέτοντας ότι ο αρχικός αριθμός των μαύρων σφαιριδίων είναι μεγάλος. Ανάλογα με τον αρχικό αριθμό άσπρων σφαιριδίων, το όριο είναι μια διαδικασία σε συνεχή χρόνο διακριτή (διαδικασία γέννησης) ή συνεχής (διάχυση *Ito*).

Η ομιλία βασίζεται σε από κοινού δουλειά με τη Δρ. Δήμητρα Κουλουμπού

Sunday 09:00-10:00

Wedge products and superoptimality

Dimitrios Chiotis
Euler International Mathematical Institute, St Petersburg State University
chiotisd@gmail.com

Abstract

Let G be a Lebesgue measurable matrix-valued function on the unit circle $\mathbb{T}$. The superoptimal analytic approximation problem entails determining a bounded analytic matrix-valued function Q on the unit disc $\mathbb{D}$ such that the following sequence

$$s^{\infty}(G-Q) = (s_0^{\infty}(G-Q), s_1^{\infty}(G-Q), s_2^{\infty}(G-Q), \dots) \tag{1}$$

is lexicographically minimised over all bounded analytic matrix-valued functions. Here $s_j^{\infty}(G-Q) = \operatorname{ess\,sup}_{z\in\mathbb{T}} s_j(G(z)-Q(z))$ and $s_j(G(z)-Q(z))$ denotes the j-th singular value of the matrix $G(z)-Q(z)$. The functions that minimise sequence (1) are called *superoptimal approximants*.

V.V. Peller and N.J. Young in 1994 proved that if G is expressible as the sum of a bounded analytic matrix-valued function on $\mathbb{D}$ and a continuous matrix-valued function on $\mathbb{T}$, then there exists a *unique* superoptimal approximant to the given function G.

In the present talk we present an algorithm which employs wedge products of Hilbert spaces along with the compactness of certain Hankel-type operators in order to compute the unique superoptimal analytic approximant. The talk is based on joint work with Z.A. Lykova and N.J. Young.

References

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Saturday 13:30-14:00

Linear Discriminant Analysis as a data dimension reduction technique

Tryfon Daras
Technical University of Crete
tdaras@tuc.gr

Abstract

In recent decades, due to the complexity of the problems of everyday life and to the rapid development of the computers (and especially the software they use), the need for simultaneous processing of a large volume of multivariate (multidimensional) data has become imperative. For this purpose and from the Statistics point of view, two major categories of methods, for analyzing such data, have been developed: (I) prediction methods / regression methods (Multiple Linear Regression) and classification methods (Logistic Regression, Cluster Analysis, Discriminant Analysis, Decision Trees). A 3rd category of problem/data dimensionality reduction methods (Factor Analysis, Principal Component Analysis) is (usually) being applied initially, before selecting (processing) any one of the above methods. In this paper, the method of Linear Discriminant Analysis (L.D.A) is presented in detail. Its basic philosophy is the classification of multidimensional data into already existing groups, with the help of a small number of linear combinations (the so-called discriminant functions) of the original variables/functions (data transformations

with the help of matrix multiplications). In other words, the projection of the original data onto a small number of orthogonal axes (reduction the dimensionality/ dimensionality of the data). More specifically, the paper reports and calculates analytically (with the help of a generalized eigenvalue/eigenvector problem) Fisher's discriminating function in the case of: (I) two groups/classes (II) three or more groups/classes. In addition to this: (a) the advantages and disadvantages of the method are being described, (b) points for its improvement and/or alternative ways of its application are highlighted and given (c) the method is compared with the rest of the prediction/ classification methods (d) the statistical tests for the significance of the discriminant functions are being described (quantification of their effectiveness in discriminating the groups). Finally, the method is applied (with the help of SPSS statistical software) to data from a real life problem.

Sunday 12:30-13:00

Global Attractor for a stochastic System of Klein - Gordon - Schrödinger Type

Michael Filippakis

University of Piraeus

mfilip@unipi.gr

Abstract

Let us consider the Cauchy problem of a coupled system of a Schrödinger equation with fractional Laplacian and fractional Klein Gordon equation of different order through Yukawa coupling.

$$\begin{aligned} idu + (\kappa(-\Delta)^a u + i\alpha u - uv)dt &= fdt + \sum_{j=1}^{m} \phi_j d\omega_j, \\ dv_t - ((-\Delta)^b v + v + \lambda v_t + Reu_x)dt &= gdt + \sum_{j=1}^{m} \phi_j d\omega_j. \end{aligned} \tag{2}$$

where $a, b \in (1/2, 1)$ and the functions $\{\phi_j\}_{j=1}^m \in H^2(\mathbb{R}) \cap W^{2,p}(\mathbb{R})$ for some $p > 1$ and $\{\omega_j\}_{j=1}^m$ are independent two-sided real-valued Wiener processes on a complete probability space. These result from the possibility that small irregularities, stochastic in time, should be taken into account.

The non stochatic system (2) for $a, b = 1$ describes the nonlinear interaction between high frequency electron waves and low frequency ion plasma waves in a homogeneous magnetic field adopted to model the UHH plasma heating scheme. The term Reu_x is a consequence of the different low frequency coupling that was considered, i.e. the polarization drift instead of the ponderomotive force. The dissipative mechanism of the system is introduced by the terms $i\alpha u$ and λv_t. It is important to notice that the system is not naturally dissipative. So the intoduction of the disspative mechanisms are necessary to force the energy to decay to zero when t goes to infinity.

Our aim is to prove with the help of the a priori estimates the existence and uniqueness of a solution of the stochatic fractional system as well as the existence of a global attractor.

The publication of this paper has been partly supported by the University of Piraeus Research Center.

Friday 18:00-18:30

Threshold for the expected measure of random polytopes

Apostolos Giannopoulos
National and Kapodistrian University of Athens
apgiannop@math.uoa.gr

Abstract

Several variants of the threshold problem have been studied, starting with the work of Dyer, Füredi and McDiarmid who established a sharp threshold for the expected volume of random polytopes with independent vertices uniformly distributed in the discrete cube $E_2^n = \{-1,1\}^n$ or in the solid cube $B_\infty^n = [-1,1]^n$. For example, in the first case, if $\kappa = 2/\sqrt{e}$ then for every $\epsilon \in (0,1)$ one has

$$\lim_{n\to\infty} \sup\left\{2^{-n}\mathbb{E}|K_N| \colon N \leq (\kappa-\epsilon)^n\right\} = 0$$

and

$$\lim_{n\to\infty} \inf\left\{2^{-n}\mathbb{E}|K_N| \colon N \geq (\kappa+\epsilon)^n\right\} = 1.$$

In 2005 we generalized this result with D. Gatzouras to the case where X_i have independent identically distributed coordinates supported on a bounded interval $[-\alpha,\alpha]$ under some mild additional assumptions. Later, further sharp thresholds were given for the volume of various classes of random polytopes, mainly in cases where X_i have rotationally invariant densities.

We consider the next very general variant of the problem. Let μ be a log-concave probability measure on $\mathbb{R}^n$ and for any $N > n$ consider the random polytope $K_N = \mathrm{conv}\{X_1,\dots,X_N\}$, where $X_1, X_2, \dots$ are independent random points in $\mathbb{R}^n$ distributed according to μ. The question is if there exists a threshold for the expected measure $\mathbb{E}_{\mu^N}[\mu(K_N)]$ of K_N. Our approach is based on the Cramer transform Λ_μ^* of μ. We examine the existence of moments of all orders for Λ_μ^* and establish, under some conditions, a sharp threshold for the expectation $\mathbb{E}_{\mu^N}[\mu(K_N)]$ of the measure of K_N: it is close to 0 if $\ln N \ll \mathbb{E}_\mu(\Lambda_\mu^*)$ and close to 1 if $\ln N \gg \mathbb{E}_\mu(\Lambda_\mu^*)$. The main condition is that the parameter $\beta(\mu) = \mathrm{Var}_\mu(\Lambda_\mu^*)/(\mathbb{E}_\mu(\Lambda_\mu^*))^2$ should be small. We shall describe the main ideas of this approach and state a number of concrete conjectures (or rather open questions) that might lead to a complete affirmative answer in full generality.

The talk is based on joint works with S. Brazitikos and M. Pafis.

Saturday 09:00-10:00

Axiomatic Foundation of Quantum Mechanics(6th Hilbert's Problem)

Anastasios Kartsaklis
National and Kapodistrian University of Athens
akartsak@math.uoa.gr

Abstract

Quantum Physics requires complex numbers to explain reality

Saturday 18:00-18:30

Homomorphisms of Fourier algebras, part II

Aristides Katavolos

National and Kapodistrian University of Athens
akatavol@math.uoa.gr

Abstract

The Fourier algebra $A(G)$ and the Fourier-Stieltjes algebra $B(G)$ of a locally compact group G were introduced by Eymard [1964]. If G is abelian, $A(G)$ and $B(G)$ can be identified, via the Fourier transform, with $L^1(\widehat{G})$ and the measure algebra $M(\widehat{G})$ of the dual group $\widehat{G}$, respectively. Cohen [1960] characterized the homomorphisms from $A(H)$ into $B(G)$ for H and G locally compact abelian groups using a characterization of idempotents in $B(G)$. Homomorphisms of Fourier algebras for general locally compact groups were studied by Ilie-Spronk [2005] and Daws [2022].

We study conditions for the extendibility of continuous algebra homomorphisms $\phi : A(H) \to B(G)$ to weak* continuous maps $L^\infty(H) \to L^\infty(G)$. When ϕ is completely bounded, it is induced by a piecewise affine map $\alpha : Y \to H$ where $Y \subseteq G$. We show that extendibility of ϕ is equivalent to α being an *open* map.

We also study the dual problem for contractive homomorphisms $\phi : L^1(H) \to M(G)$. We show that ϕ induces a w* continuous homomorphism between the von Neumann algebras of the groups if and only if the naturally associated map θ (Greenleaf [1965], Stokke [2011]) is a *proper* map.

This is a report of joint work with M. Anoussis and G. K. Eleftherakis.

Saturday 10:30-11:00

Petals of Semigroups of Holomorphic Functions

Maria Kourou

Julius-Maximilians University of Wuerzburg
maria.kourou@mathematik.uni-wuerzburg.de

Abstract

Let $(\phi_t)_{t\geq 0}$ be a one-parameter semigroup of holomorphic self-maps of the unit disk $\mathbb{D}$. A boundary fixed point σ of (ϕ_t) is called repelling if $\phi_t'(\sigma) \in (1, +\infty)$ (in the angular limit sense). Every repelling fixed point of (ϕ_t) is associated to a petal Δ i.e. an open simply connected subset of $\mathbb{D}$, where $(\phi_{t|\Delta})$ is a group of automorphisms.

We discuss some properties of petals obtained in a joint work with Pavel Gumenyuk and Oliver Roth. Special attention is given to the conditions establishing conformality of a petal Δ at its associated repelling fixed point.

Saturday 17:00-17:30

The lower dimensional slicing problem for mixed volumes and related inequalities

Dimitrios Marios Liakopoulos

National and Kapodistrian University of Athens
dimliako1@gmail.com

Abstract

The classical slicing problem asks if there exists an absolute constant $C_1 > 0$ such that for every $n \geq 2$ and every convex body K in $\mathbb{R}^n$ with barycenter at the origin one has

$$|K|^{\frac{n-k}{n}} \leq \alpha^k \max_{F \in G_{n,n-k}} |K \cap F|.$$

The case $k = n - 1$ is equivalent to the well-known isotropic constant conjecture.

In the present talk we will discuss a version of this problem where volume is replaced by surface area. The question is if there exists a constant α_n such that

$$S(K) \leq \alpha_n |K|^{\frac{1}{n}} \max_{\xi \in S^{n-1}} S(K \cap \xi^{\perp})$$

where S denotes surface area. We provide a negative answer, for any fixed dimension, to this question as well as to a weaker version in which sections are replaced by projections onto hyperplanes. Also, we discuss the same problem for sections and projections of lower dimension and for all the quermassintegrals of a convex body. On the other hand, we prove two-sided inequalities which they compare the j-th quermassintegral of a convex body K in $\mathbb{R}^n$ with the averge of the j-th quermassintegrals of k-codimensional sections of K. Using these estimates we obtain some positive results for suitable versions of the slicing problem for the quermassintegrals of a convex body.

The author acknowledges support by the Hellenic Foundation for Research and Innovation (H.F.R.I.) under the "First Call for H.F.R.I. Research Projects to support Faculty members and Researchers and the procurement of high-cost research equipment grant" (Project Number: 1849).

Sunday 10:30-11:00

On the asymptotic distribution of the least singular value of random matrices with alpha-stable entries

Michalis Louvaris

National and Kapodistrian University of Athens
louvarismixalis@gmail.com

Abstract

In the past few years, there has been an increasing interest in results from Random Matrix Theory (RMT). In general, RMT investigates the asymptotic behaviour of several elements of the spectrum of random matrices as the matrix-dimension tends to infinity.

This talk is based on my recent work and investigates the asymptotic spectral property of a heavy tailed random matrix model. We determine the asymptotic distribution of the least singular value of random matrices with α-stable entries. Specifically, if $\lambda_1(X_N X_N^T)$ denotes the least eigenvalue of the matrix $X_N X_N^T$, where X_N is an $N \times N$ matrix with identically distributed and independent α- stable entries, appropriately normalized, then

$$\lim_{N \longrightarrow \infty} \mathbb{P}(N^2 \lambda_1(X_N X_N^T) \leq r) = 1 - \exp(-\frac{r^2}{2} - r) \qquad \forall r \in \mathbb{R}^+. \tag{3}$$

The basic difference of this model with other classical models from RMT (Wigner Matrices, Wishart Matrices, Sparse Matrices etc) is that the entries of the matrix have heavy tails and very few finite moments (infinite variance, possible infinite mean). The

methods that are used are based on the modern techniques, whose heart is the three step strategy, an important strategy developed in the last decade in the RMT literature. So before presenting the proof of (3), a short overview of the three step strategy will be sketched.

Sunday 10:00-10:30

The behaviour of the solutions of the double phase problem as the lowest growth goes to 1

Alexandros Matsoukas

National Technical University of Athens
alexmatsoukas@mail.ntua.gr

Abstract

Let Ω be a bounded open subset of $\mathcal{R}^n$, $1 < p < q$, and $f \in L^\infty(\Omega)$. We consider the following double phase problem

$$-\mathrm{div}(|\nabla u|^{p-2}\nabla u) - \mathrm{div}(a(x)|\nabla u|^{q-2}\nabla u) = f \text{ in } \Omega$$
$$u = 0 \text{ on } \partial\Omega\,,$$

where a is bounded function with $a(x) \geq 0$ a.e. in Ω.

This is a particular case of problems with non-standard growth and hence its natural functional framework is that of the generalized Orlicz and generalized Orlicz-Sobolev spaces. Our aim in this talk is to discuss the behaviour of the solutions of the above problem, as the lowest growth p goes to 1.

The talk is based on joint work with Nikos Yannakakis.

Saturday 13:00-13:30

A class of Einstein submanifolds of Euclidean space

Christos-Raent Onti

University of Cyprus
onti.christos-raent@ucy.ac.cy

Abstract

The knowledge on the subject of Euclidean Einstein submanifolds, except those with constant sectional curvature, is quite limited. In fact, as far as we know, until now the only classification result available under purely intrinsic assumptions is in the case of hypersurfaces, due to an observation by Cartan communicated by Thomas in 1937 and the work of Fialkow from 1938. In the talk, I will discuss the characterization of a class of Einstein manifolds isometrically immersed into Euclidean space as rotational submanifolds. The highlight is for submanifolds in codimension two since in this case our assumptions are purely intrinsic. This is a joint work with Marcos Dajczer (IMPA) and Theodoros Vlachos (University of Ioannina).

References

[1] M. Dajczer, C.-R. Onti, Th. Vlachos, A class of Einstein submanifolds of Euclidean space, J. Geom. Anal., 32, 2022, no 2, Paper No. 64, 20,

Sunday 12:00-12:30

Exponential Decay for a Klein-Gordon-Schrodinger System with locally Distributed Damping

Marilena Poulou

University of West Attica
mpoulou@uniwa.gr

Abstract

The aim of this paper is to study the following KGS system defined in Ω which is a bounded domain in $\mathbb{R}$

$$i\psi_t + \kappa\psi_{xx} + i\alpha b(x)\psi = \phi\psi\chi(\omega), \quad (4)$$

$$\phi_{tt} - \phi_{xx} + \phi + \lambda(x)\phi_t = -Re\psi_x, \quad (5)$$

satisfying the following initial conditions

$$\psi(x,0) = \psi_0(x),\ \phi(x,0) = \phi_0(x),\ \phi_t(x,0) = \phi_1(x), \quad (6)$$

with locally distributed damping and where Γ is a smooth boundary and ω is an open subset of Ω such that $meas(\omega) > 0$ and satisfying the geometric control condition. Let $\alpha > 0$ and $\chi(\omega)$ to represent the characteristic function, that is $\chi = 1$ in ω and $\chi = 0$ in $\Omega \setminus \omega$. We also consider $b, \lambda \in L^\infty(\Omega)$ to be nonnegative functions such that

$$b(x) \geq b_0 > 0 \ \in \ \omega, \ \text{ and } \ \lambda(x) \geq \lambda_0 > 0 \ \in \omega,$$

in order for the nonlinearity ψ to exist where the damping terms

$$i\alpha b(x)\psi, \ \ \lambda(x)\phi_t$$

are effective and reciprocally. If the damping is effictive in the whole domain, i.e. $b(x) \geq b_0 > 0 \ \in \Omega$ and $\lambda(x) \geq \lambda_0 > 0 \ \in \Omega$ we can consider $\chi_\omega \equiv 1 \ \in \Omega$.

Friday 18:30-19:00

On a multi-integral norm defined by weighted sums of log-concave random vectors

Nikos Skarmogiannis

National and Kapodistrian University of Athens
nikskar@math.uoa.gr

Abstract

Let C and K be centrally symmetric convex bodies in $\mathbb{R}^n$. We show that if C is isotropic then

$$\|\mathbf{t}\|_{C^s,K} = \int_C \cdots \int_C \Big\| \sum_{j=1}^s t_j x_j \Big\|_K dx_1 \cdots dx_s \leq c_1 L_C (\log n)^3 \sqrt{n} M(K) \|\mathbf{t}\|_2$$

for every $s > 1$ and $\mathbf{t} = (t_1, \ldots, t_s) \in \mathbb{R}^s$, where L_C is the isotropic constant of C and $M(K) := \int_{S^{n-1}} \|\xi\|_K d\sigma(\xi)$. This reduces a question of V. Milman to the problem of estimating from above the parameter $M(K)$ of an isotropic convex body. The proof is based on an observation that combines results of Eldan, Lehec and Klartag on the slicing problem: If μ is an isotropic log-concave probability measure on $\mathbb{R}^n$ then, for any centrally symmetric convex body K in $\mathbb{R}^n$ we have that

$$I_1(\mu, K) := \int_{\mathbb{R}^n} \|x\|_K \, d\mu(x) \leq c_2 \sqrt{n} (\log n)^3 \, M(K).$$

We provide further applications of this inequality, which is of independent interest.

Saturday 19:00-19:30

Sharp oscillation conditions for delay differential equations

Ioannis Stavroulakis

University of Ioannina

ipstav@uoi.gr

Abstract

Consider the differential equation with a retarded argument of the form

$$x'(t) + p(t)x(\tau(t)) = 0, \quad t \geq t_0, \tag{1.1}$$

where the functions $p, \tau \in C([t_0,\infty), \mathbb{R}^+)$, (here $\mathbb{R}^+ = [0,\infty)$), $\tau(t) \leq t$ for $t \geq t_0$ and $\lim_{t\to\infty} \tau(t) = \infty$ and the equation with a constant positive delay τ of the form

$$x'(t) + p(t)x(t-\tau) = 0, \quad t \geq t_0. \tag{1.1}'$$

Sharp conditions for the oscillation of all solutions to these equations are presented when the well-known oscillation conditions

$$\limsup_{t\to\infty} \int_{\tau(t)}^t p(s)ds > 1 \quad \text{and} \quad \liminf_{t\to\infty} \int_{\tau(t)}^t p(s)ds > \frac{1}{e}$$

are not satisfied. In the case that the function $\int_{t-\tau}^t p(s)ds$ is slowly varying at infinity, then under mild additional assumptions

$$\limsup_{t\to\infty} \int_{t-\tau}^t p(s)ds > \frac{1}{e}$$

is a sharp condition for the oscillation of all solutions to Eq.(1.1)′. This result is also extended to the following linear differential equation with several variable delays

$$x'(t) + \sum_{i=1}^m p_i(t)x(t-\tau_i(t)) = 0, \quad t \geq t_0. \tag{1.2}$$

where $p_i : [t_0,\infty) \to [0,\infty)$ and $\tau_i : [t_0,\infty) \to [0,\infty)$ are continuous functions such that $t - \tau_i(t) \to \infty$ (as $t \to \infty$) for all $1 \leq t \leq m$.

Friday 19:00-19:30

The angle along a curve: range-kernel complementarity and applications

Nikos Yannakakis

National Technical University of Athens, Greece nyian@math.ntua.gr

Abstract

We define the angle of a bounded linear operator A along a curve emanating from the origin and use it to characterize range-kernel complementarity.

In particular we show that if $\sigma(A)$ does not separate 0 from ∞, then

$$X = R(A) \oplus N(A)$$

if and only if $R(A)$ is closed and some angle of A is less than π.

We first apply this result to invertible operators that have a spectral set that does not separate 0 from ∞. Next we extend the notion of angle along a curve to Banach algebras and use it to prove two characterizations of elements in a semisimple and in a C^* commutative algebra respectively, whose spectrum does not separate 0 from ∞.

The talk is based on joint work with D. Drivaliaris

Saturday 16:30-17:00