Proceeding Book

International Conference on Recent Advances In Pure and Applied Mathematics, (ICRAPAM'2024)

November 20-21, 2024

Mathematics Department, University of 20 August 1955-Skikda

Skikda, Algeria

Conference Chairs

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Dr. LALLOUCHE Abdallah, **General co-Chair**

Dr. KHEMIS Rabah, **President of Scientific Committee**

Dr. BOUZETTOUTA Lamine, **President of Organizing Committee**

Honorary Committee

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Pr. **KEBIR ABDENNOUR**, **Dean of Sciences Faculty**

Pr. GUESMIA Amar, **Director of Laboratory of Applied Mathematics and History and Didactics of Mathematics**

Invited Speakers

Professor. Spiteri Piéne **(IRIT -SITE Enseeiht TOULOUSE/France)**

Title: *Behaviour of asynchronous subdomain method implimented on cloud computing for the numerical solution of PDE*

Professor. **Kais Ammari (University of Monastir/Tunisie)**

Title: *Regularity of the semi groups associated with some damped coupled elastic systems*

Professor. **KURULAY Muhammet (**UnivYrldrz Teknik/Turquie)

Title: *Solving a system of nonlinear fractional partial differential equations using three dimensional differential transform method*

Professor. **Salem shafiq al- ashhab (**A1-albayt university/Jordanie)

Title: *On the limit of two dimentional systems of difference equations*

Professor. **Zennir Khaled (**Quassim university/arabia saoudite)

Title: *Destruction of solutions for class of time-PDEs with p(x)- bi-Laplace*

Professor. **Ahmed khadhim Hussein (**Univ Babylon / IRAQ)

Title: *Adopting amathematical model to simulate the performance of solar collector filled with hybrid nonofluid*

Preface

The Department of Mathematics of the University of 20 August 1955 of SKIKDA in collaboration with the Laboratory of Applied Mathematics and History and Didactics of Mathematics organizes the "International Conference On Recent Advances In Pure And Applied Mathematics, ICRAPAM'2024", from 20 to 21 November 2024 , inviting all scientific and professional participants working in the field to enrich the conference with their contributions.

The conference will focus on the latest advanced research in pure and applied mathematics and will be an excellent opportunity to identify, share and discuss recent open questions and provide solutions to research challenges and problems in various current topics related to mathematics, including algebra, analysis, statistics, ...etc.

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The main topics of the conference

1- Numerical analysis, optimization and simulation

2- Algebra, number theory and applications

3- Probability and statistics

4- Fractional calculus and modeling

5- Dynamical systems and ODE

6- Functional analysis and PDEs

7- Stochastic calculus and financial mathematics

Main Program

November 20

PLACE	Time	Activity			UNIVERSITY	Title of presentation
Conference room (600 places)	08h00 - 09h00	**Inscription**				
Conference room (600 places))	09h00 - 09h30	**Official opening**				
Amphithéâtre L	09h30 - 10h50	Session 1 : Plenary	**Pr. H. SISAOUI**	9h30-10h10	Pr. A. NOUAR	قراءة في تاريخ الرياضيات بين النظري و التطبيقي
				10h10-10h50	Pr. P. SPITERI	BEHAVIOUR OF ASYNCHRONOUS SUBDOMAIN METHOD IMPLIMENTED ON CLOUD COMPUTING FOR DE NUMERICAL SOLUTION OF PDE
	10h50 - 11h10	**Coffee break poster session (1)**				
ROOM 1,2,3,4	11h10 - 12h30	Session 2 : Workshops	ROOM 01 **Pr. A.GUESMIA**	11h10-11h30	DEBZ NASSIMA	ON THE MAXIMUM NUMBER OF LIMIT CYCLES OF KUKLES POLYNOMIAL DIFFERENTIAL SYSTEMS
				11h30-11h50	REZAIKI NABIL	LIMIT CYCLES OF PERTURBED CUBIC UNIFORM ISOCHRONOUS CENTER VIA AVERAGING METHOD
				11h50-12h10	BOUCHELAGHEM FAYCAL	STUDY EXISTENCE, STABILITY AND EXPONONTIAL STABILITY OF POSITIVE PERIODIC SOLUTIONS FOR DYNAMIC EQUATIONS
				12h10-12h30	Houria CHELLAOUA	EXPONENTIAL STABILITY OF NONAUTONOMOUS SEMILINEAR EVOLUTION EQUATIONS WITH TIME-VARYING DELAY FEEDBACK
			ROOM 02 **Pr. M.MAOUNI**	11h10-11h30	SELMANI WISSAME	A VARIANT OF THE WEIGHTED QUASI-BOUNDARY VALUE METHOD FOR AN ABSTRACT FRACTIONAL GENERALIZED ELLIPTIC CAUCHY PROBLEM
				11h30-11h50	SAIHI FERIAL	ASYMPTOTIC NORMALITY OF KERNEL DENSITY ESTIMATORS FOR CENSORED ASSOCIATED DATA
				11h50-12h10	MADJOUR BILEL	GENERAL DECAY OF THE VISCOELASTIC EULER-BERNOULLI EQUATION WITH LOGARITHMIC NON LINEARITY
				12h10-12h30	ACHAB FATMA	OPTIMAL CONTROL OF BILINEAR WAVE EQUATION WITH MISSING INITIAL CONDITION
			ROOM 03 **Pr. H.LEKHAL**	11h10-11h30	LAKIKZA HANANE	WELL-POSEDNESS OF A NONLINEAR INTERFACE PROBLEMS OF A MULTIPHASE MULTICOMPNENT MODEL
				11h30-11h50	BOUNOUALA AMINA	WEAK SOLUTION FOR A CLASS OF p(x)-LAPLACIAN EQUATIONS
				11h50-12h10	BERHAIL AMEL	ON NONLOCAL INTEGRAL AND DERIVATIVE BOUNDARY VALUE PROBLEM OF NONLINEAR LANGEVIN EQUATION
				12h10-12h30	HALLOUZ ABDELHAMID	STABILIZATION AND REGULARITY OF A COUPLED SYSTEM
			ROOM 04 **Dr. M.BENHADRI**	11h10-11h30	TOUATI MOHAMED	EXISTENCE AND MULTIPLICITY OF SOLUTIONS FOR GJMS OPERATORS (K=2) ON NON-EINSTEIN MANIFOLDS
				11h30-11h50	BELLAMOUCHI CHAHINEZ	EXISTENCE OF POSITIVE RADIAL SOLUTION FOR SOME NONLOCAL ELLIPTIC PROBLEM
				11h50-12h10	HETTADJ DJAMEL-EDDINE	EXISTENCE RESULTS FOR NONLINEAR FRACTIONAL DIFFERENTIAL INCLUSION
				12h10-12h30	SAIFIA OUARDA	EXISTENCE RESULT FOR NONLINEAR FRACTIONAL DIFFERENTIAL SYSTEM WITH BOUNDARY CONDITIONS
	13h00 - 13h45	**LUNCH**				
Amphithéâtre L	13h45 - 14h25	Session 3 Plenary	**Pr. A NOUAR**	13h45-14h25	Pr. AHMED ABELMONEIM EL-DEEB	ADVANCES IN DYNAMICS INEQUALITIES ON TIME SCALES AND ITS APPLICATIONS TO THE QUALITATIVE THEORY
room 01,02,03,04	14h25 - 15h25	Session 4 : workshops	ROOM 01 **Pr. Z.HOUEN**	14h25-14h45	HAMIDI NABIL	GLOBAL ANALYSIS OF A MODEL OF COMPETITION IN CHEMOSTAT WITH INHIBITION
				14h25-14h45	LOUNES AMEUR	A NUMERICAL SOLUTION FOR THE SINGLE-SERVER QUEUE WITH PHASE TYPE DISTRIBUTION SERVICE TIMES

				14h45-15h05	DIABI DALLEL	Nonlinear Delay Integral Inequalities: Exploring the Volterra-Fredholm Framework on Time Scales
				15h05-15h25	DJEDID ZAHIA	ON SOLUTIONS OF DIFFERENTIAL AND INTEGRAL EQUATIONS USING NEW FIXED POINT IN CONE Eb METRIC SPACES
			ROOM 02 **Dr. H.KHOCHMEN**	14h25-14h45	HANENE DEBBICHE	ON A GENERALIZED NON-TATIONARY STOKES PROBLEM UNDER TRESCA'S FRICTION BOUNDARY CONDITION
				14h25-14h45	MARWA DJEMOUI	A STABILITY RESULT FOR A NONAUTONOMOUS DELAYED VISCOELASTIC WAVE EQUATION
				14h45-15h05	ZEGHDANE REBIHA	ROBUST METHODS FOR APPROXIMATING SOLUTIONS TO STOCHASTIC INTEGRAL EQUATIONS
				15h05-15h25	CHAHNAZ TIMIMOUN	WELL-POSEDNESS AND EXPONENTIAL STABILITY OF THE KDV EQUATION WITH TIME-DELAY
			ROOM 03 **Dr. K. SLIMANI**	14h25-14h45	HIBER NOUR EL ISLAM	A GLOBAL OPTIMIZATION APPROACH USING α-DENSE CURVES
				14h25-14h45	H. B. BOULARES	BOUNDEDNESS OF SOME SUBLINEAR OPERATORS ON WEAK HERZ SPACES WITH VARIABLE EXPONENTS
				14h45-15h05	KELTHOUM LINA REDOUANE	AN ADVANCED COMPUTATIONAL APPROACH THROUGH THE INTEGRATION OF CUBIC B SPLINE METHOD FOR THE RESOLUTION OF A NON-LINEAR WAVE EQUATION
				15h05-15h25	GHENNEM KARIMA	STUDY OF LAMINATED BEARS WITH INTERFACIAL SHIP
			ROOM 04 **Pr. M.BOUDIAF**	14h25-14h45	BOUDEHANE KHEIREDDINE	STANDBY REDUNDANCY IN REPAIRABLE SYSTEMS WITH GENERAL REPAIR TIMES
				14h25-14h45	BENKEMACHE IBTISSEM	HOW TO SOLVE A CONFORMABLE PARTIAL DIFFERENTIAL EQUATIONS BY ATOMIC SOLUTION
				14h45-15h05	KAREK CHAFIA	ASYMPTOTIQUE BEHAVIOUR OF EVOLUTION PROBLEM IN A PERFORATED DEMAIN
				15h05-15h25	TABET ACHREF EDDINE	MAXIMUM NUMBER OF LIMIT CYCLES FOR A CLASS OF DIFFERENTIAL SYSTEMS VIA FOURTH-ORDER AVERAGINGTHEORY
	15h25 - 15h45	**Coffee break poster session (2)**				

15h45 Visit to the University Science Museum and Botanical Garden

November 21

place	time	Activity				
Conference room (600 places)	08h00 - 09h00	**Inscription**				
Amphithéâtre L	09h00 - 9h40	Session 1 Plenary			Dr. BENDIB RIAD	MATHEMATICS AND STARTUPS
room 1,2,3,4	09h40 - 10h40	Session 2 : workshops	ROOM 01 **Dr. Z.MARSA**	09h40-10h00	KINA ABDELKRIM	A CLASS OF AUTONOMOUS LI...NARD DIFFERENTIAL SYSTEMS WITH AN EXPLICIT ALGEBRAIC LIMIT CYCLE
				10h00-10h20	BENHADRI MIMIA	POSITIVITY OF PERIODIC SOLUTIONS FOR A CLASS OF FUNCTIONAL DELAY DIFFERENTIAL EQUATIONS
				10h20-10-40	MOHAMED CHERIF BELILI	BIFURCATION ANALYSIS AND STABILITY IN A DISCRETE-TIME SIRS MODEL: INSIGHTS FROM THE COVID-19 PANDEMIC IN THE USA
				10h40-11h00	HAMDI ZAKARIA	Von Kàrmàn Equations with Infinite Memory
			ROOM 02 Dr. **N.RAMDANE**	09h40-10h00	FELLAG ARIOUAT AYYOUB	SOME PROPERTIES OF NON NORMAL OPERATOR ON HILBERT SPACES
				10h00-10h20	NABILA BELLEL	EXPONENTIAL STABILITY RESULT FOR A POROUS PROBLEM WITH FRACTIONAL TIME DELAYS
				10h20-10-40	SETTARA LOUBNA	AN INVERSE SOURCE TIME FRACTIONAL DIFFUSION PROBLEM VIA AN INPUT-OUTPUT MAPPING
				10h40-11h00	OUAOUA Amar	ON THE BLOW-UP OF SOLUTIONS FOR A COUPLE OF PARABOLIC EQUATIONS WITH MEMORY TERMS AND VARIABLE EXPONENTS

			ROOM 03 **Dr. S.LEULMI**	09h40-10h00	LATRECHE ABDELKRIM	THE UNIVERSAL MORHISM 'PRODUCT' IN THE CATEGORY OF SINGLE VALUED NEUTROSOPHIC SETS
				10h00-10h20	MEBDOUA RABAH	ON CONVOLVED GENERALIZED FIBONACCI AND LUCAS POLYNOMAILS
				10h20-10-40	BOUSSETOUAN IMANE	EXISTENCE AND REGULARITY RESULTS FOR AN ELLIPTIC SYSTEM WITH MIXED BOUNDARY CONDITIONS
				10h40-11h00	CHOUADER RIMA	NON-EXISTENCE OF LIMIT CYCLE OF SEPTIC KOLMOGOROV SYSTEM
			ROOM **04** **Dr.A.BOULFOUL**	09h40-10h00	NOUAOURA SARRA	EFFECT OF DECAY TERMS ON THE THREE-TIERED MODELOFANAEROBIC DIGESTION
				10h00-10h20	HOUASNI MOHAMED	ON THE EXPONENTIAL DECAY OF A THERMOELASTIC POROUS SYSTEM WITH A FORCING TERM AND CONSTANT DELAY
				10h20-10-40	BOUCENA DJALAL	GENERAL DECAY RESULT FOR A NONLINEAR TIMOSHENKO SYSTEM
				10h40-11h00	MELLAHI NAWAL	LIMIT CYCLES FOR GENERALIZATION OF POLYNOMIAL LIENARD DIFFERENTIAL SYSTEMS
	10h40 - 11h00	**Coffee break poster session (3)**				
room 1,2,3,4	11h00 - 12h20	Session 3 : workshops	ROOM 01 **Dr. S.LAGRAF**	11h00-11h20	ABDALLAH BRIK	ON THE LIMIT CYCLES OF A SECOND ORDER DIFFERENTIAL SYSTEM
				11h20-11h40	KHELILI BESMA	A MODIFIED QUASI-BOUNDARY VALUE METHOD FOR AN ABSTRACT ILL-POSED CAUCHY PROBLEM GOVERNED BY A DIFFERENTIAL-OPERATOR EQUATION OF FOURTH ORDER
				11h40-12h00	IBRAHIM DAAMECHE	EXISTENCE AND STABILITY RESULTS FOR THERMODIFFUSION LAMINATED BEAM SYSTEM WITH DELAY FEEDBACK
				12h00-12h20	SOULEF BOUGUEROUA	NUMERICAL COMBINATION OF ANISOTROPIC AND ISOTROPIC TV DENOISING PROBLEMS
			ROOM 02 **Pr. S.ZITOUNI**	11h00-11h20	TOUNSI LABCHAR	AROUND GENERALIZATION STIRLING NUMBERS AND BELL POLYNOMIALS
				11h20-11h40	OUCHEN IMENE	ON BAYESIAN BONUS-MALUS PREMIUM UNDER LINEX LOSS FUNCTION WITH APPLICATIONS
				11h40-12h00	ABDELKADER BOUDELLAL	MORDELL-TORNHEIM MULTIPLE ZETA VALUES AT NON-POSITIVE INTEGERS
				12h00-12h20	ABBAD BILAL	THE EXPONENTIAL DECAY OF A THERMOELASTIC POROUS SYSTEM WITH A FORCING TERM AND NON-VARIANT DELAY
				12h20-12h40	CHALABI el hacène	PROVING THE CONVERGENCE OF CARATHÉODORY'S APPROXIMATE SOLUTIONS IN NON-LIPSCHITZ STOCHASTIC SYSTEMS DRIVEN BY G-BROWNIAN MOTION
			ROOM 03 **Dr. L.BOUZETTOUTA**	11h00-11h20	HEBHOUB FAHIMA	STABILIZATION OF A MICROTEMPERATUR POROUS-ELASTIC SYSTEM WITH DISTRIBUTED DELAY-TIME
				11h20-11h40	KHENNICHE GHANIA	A NUMERICAL METHOD BASED ON FINITE DIFFERENCE FOR WAVE SYSTEM WITH VARIABLE COEFFICIENT
				11h40-12h00	BEDRANI YASSINE	NEW INEQUALITIES RELATED TO ACCRETIVE MATRICES
				12h00-12h20	LALLOUCHE Abdallah	Qualitative Behaviour of Some Biological Mathematical Models
Amphithéâtre L	12h40 - 13h25	**Closing**				
	13h25 -	**LUNCH**				

Poster session 1

MAADANI Mustapha	University Hassiba Benbouali	ON CLASS A OF OPERATORS IN SEMI-HILBERTIAN SPACES
ABED YFRAH	University Relizane, Relizane	NUMERICAL ANALYSIS AND SIMULATION FOR A VISCOELASTIC WAVE EQUATION
Djahida Tilbi	University 20 August 1955, Skikda	*Simulation of Burr-Hatke exponential distribution in R*
KEDDALI MERIEM	University Badji Mokhtar, Annaba	RETROACTIVE EXAMINATION UNDER VARYING LOSS FUNCTIONS FOR TYPE II CENSORED DATA
CHOUIA SARRA	University badji mokhtar, Annaba.	THE NEW MIXTURE DISTRIBUTION PROPERTIES & APPLICATION
BELYACINE ZAHIA	University 20 August 1955, Skikda	NON TRIVIAL SOLUTION FOR A NON LINEAR ELLIPTIC EQUATION OF (p, q)- LAPLACIEN PROBLEM AT RESONANCE
FOUGHALI FOUZIA	University 20 August 1955, Skikda	WELL-POSEDNESS AND GENERAL DECAY FOR A THERMOELASTIC SWELLING POROUS SYSTEM WITH SECOND SOUND
HANECHE NABIL	University of Mentouri Brothers, Constantine.	A SECURE COMMUNICATION SCHEME BASED ON ADAPTIVE HYBRID SYNCHRONIZATION OF FRACTIONAL-ORDER HYPERCHAOTIC SYSTEMS
BELLABES ZINEB	University of TIARET	CONFORMABLE DERIVATIVE AND EVOLUTION EQUATION
ROUMAISSA ELBAY	University Mohamed Khider, Biskra.	LEAST-SQUARES CROSS-VALIDATION BANDWIDTH SELECTION FOR KERNEL DISTRIBUTION FUNCTION UNDER DOUBLE TRUNCATION DATA
BELLABES ZINEB	University of TIARET	EXISTENCE AND STABILITY OF WEAK SOLUTIONS FOR SEQUENTIAL FRACTIONAL DIFFERENTIAL EQUATIONS IN BANACH
ABDELI MANEL	University 20 August 1955, Skikda	STABILIZATION OF THERMOELASTIC BRESSE SYSTEM WITH DISTRIBUTED NEUTRAL DELAY
BENATMANE Chaabane	University 20 August 1955, Skikda	Generating Probability Densities Using the Modified Poisson Process
FAGHMOUS CHADIA	University 20 August 1955, Skikda	QUADRATIC DECOMPOSITION OF 2-ORTHOGONAL POLYNOMIALS SEQUENCES
BENDIB EL OUAHMA	University 20 August 1955, Skikda	PHASE PORTRAITS FOR A CERTAIN CLASS OF GENERALIZED POLYNOMIAL DIFFERENTIAL SYSTEMS

Poster session 2

AMEL ELBAHI	University 20 August 1955, Skikda	POSITIVE PERIODIC SOLUTIONS FOR NEUTRAL FUNCTIONAL DIFERENTIAL SYSTEMS WITH ITERATIVE TERM
BENAOUDA OUM ELKHEIR	University of Science and Technology Oran	ASYMPTOTIC NORMALITY OF A NONPARAMETRIC ESTIMATOR OF THE CONDITIONAL DENSITY FUNCTION FOR FUNCTIONAL DATA
BENZAHI AHLEM	University center of Mila	EXISTENCE RESULT FOR NONLINEAR IMPLICIT FRACTIONAL DIFFERENTIAL EQUATIONS WITH NON INSTANTANEOUS IMPULSES UNDER CAPUTO-FABRIZIO DERIVATIVE
KIMOUCHE KARIMA	University 20 August 1955, Skikda	ON THE PROBABILISTIC STRUCTURE OF SOME SBL MODELS
HACHELFI MOUNAL	University Badji Mokhtar, Annaba	ENERGY DECAY RESULT OF THERMOELASTIC SYSTEM BY MICROTEMPERATURE EFFECTS
FEKRACHE ZINE EDDINE	University constantine 1, constantine	HOPF BIFURCATION OF THE COEXISTENCE EQUILIBRIUM AND STABILITY FOR A DIFFERENTIAL-ALGEBRAIC BIOLOGICAL ECONOMIC SYSTEM: PREDATOR HARVESTING
HABIBA TOUMI	University 20 August 1955, Skikda	MULTIPLE WELL-POSEDNESS OF HIGHER-ORDER OF THE ABSTRACT CAUCHY PROBLEM
WAHIBA METIRI	University 20 August 1955, SkikdA	A DENSITY FUNCTIONAL THEORY STUDY (DFT) OF ELECTRONIC PROPERTIES OF X3V (X = Ir, Rh) INTERMETALLIC COMPOUNDS
LEULMI SOUMYA	University 20 August 1955, Skikda	THEORETICAL AND NUMERICAL RESULTS FOR LINEAR OPTIMIZATION
LEULMI ASMA	University of Ferhat Abbas Setif-1	A MODIFIED NONLINEAR CONJUGATE GRADIENT ALGORITHM FOR UNCONSTRAINED OPTIMIZATION PROBLEMS
BOUDJEMA Souhila	University 20 August 1955, Skikda	S- asymptotically w-periodic solutions of heat equations
MEZHOUD KENZA ASSIA	University of Constantine 1	Asymptomatic normality of recursive relative error regression estimator
OUIZA IMINE	University of Bouira , Algeria	PLANAR BIPARTITE MIXED GRAPHS

OUDINA SIHEM	Badji Mokhtar-Annaba University,	GLOBAL BEHAVIOR OF THE BIOLOGICAL MODEL
HANNACHE Amel	University 20 August 1955, Skikda	UN PROBLEME D' EVOLUTION AVEC OBSTACLE PAR´ DECOMPOSITION DE DOMAINE SANS RECOUVREMENT
Bekri Houria	University of Bouira	Solve a system of nonlinear equations and inequations using global optimization procedures
LALLOUCHE ABDALLAH	University 20 August 1955, Skikda	Stochastic Perturbation of Mathematical Models in Population Dynamics
LECHEHEB SAMIRA	University 20 August 1955, Skikda	EXISTENCE RESULTS FOR A NONLINEAR (P(X),Q(X))-ELLIPTIC SYSTEM VIA TOPOLOGICAL DEGREE
FERRAG AZOUZ	Higher Normal School of Technological Education,Skikda	EXISTENCE OF SOLUTION FOR STOCHASTIC NONLOCAL RANDOM FUNCTIONAL INTEGRAL INCLUSION
MANSOURI BOUZID	Higher Normal School of Technological Education,Skikda	Etude de l'existence globale et la stabilité exponentielle pour un système non linéaire de Timoshenko avec retard
BOULEZAZ CHAIMA	University of Constantine1	Applying feed back control to full synchronize two different chaotic systems with unknown characteristics
TABET ISMAIL	University 20 August 1955, Skikda	THERMAL MODELING OF HYBRID PHOTOVOLTAIC THERMAL SOLAR AIR COLLECTOR
Meriem Chieul	University 20 August 1955, Skikda	Wind Turbine Optimal Control by PI Power
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Badis Aouzal	University 20 August 1955, Skikda	Statistical Modeling of LC-MS/MS Phytochemical Analysis of Ruta montana and Its Hepatoprotective Effects in Male Rats Exposed to Tebuconazole"
GHERAIBIA Sabrina	University 20 August 1955, Skikda	Numerical Approximation of the Salar Pond by Homotopy Method

Poster session 3

ZIBOUCHE WASSILA	University 20 August 1955, Skikda	SOLVABILITY OF SECOND ORDER DIFFERENTIAL OPERATOR WITH IRREGULAR INTEGRAL BOUNDARY CONDITION AND TRANSMISSION CONDITIONS
Fateh SACI	University 20 August 1955, Skikda	MATHEMATICAL STUDY OF THE BAGLEY-TORVIK EQUATION
AFEF AMINA RABIA	University Badji Mokhtar, Annaba	ON PERIODIC SOLUTIONS FOR A CLASS OF SECOND-ORDER DIFFERENTIAL EQUATIONS VIA AVERAGING THEORY
Boulkheloua Chaima	University 20 August 1955, Skikda	STABILITY RESULTS FOR LORD SHULMAN THERMOELASTIC SYSTEM WITH POROUS DAMPING AND DISTRIBUTED DELY TEM
Boucenna Ahcene	University 20 August 1955, Skikda	Application des systèmes de Chaos au Cryptage d'images
KHELED CHEIKH	University 20 August 1955, Skikda	THEORITICAL STUDY OF PD3V AND PT3V INTERMETALLICS BASED ON DENSITY FUNCTIONAL THEORY (DFT) METHOD
FAGHMOUS CHADIA	University 20 August 1955, Skikda	QUADRATIC DECOMPOSITION OF 2-ORTHOGONAL POLYNOMIALS SEQUENCES
HADDARI ALLAEDDINE	University Batna 2	CHARACTERISTICS AND UTILIZATIONS OF THE MODIFIED BIVARIATE POISSON-LINDLEY APPROACH IN SOCCER
BENFERDI SABRINA	University 20 August 1955, Skikda	Variational analysis of some frictionless contact problems
KAREK WIDAD	University 20 August 1955, Skikda	EXPONENTIAL STABILITY OF SWELLING POROUS WITH GURTIN –PIPKIN THERMOELASTICITY AND DELAY TERM

UNIQUE COMMON FIXED POINTS IN METRIC AND DISLOCATED METRIC SPACES

HAKIMA BOUHADJERA

Abstract. This work deals with the existence and uniqueness of common fixed points in metric and dislocated metric spaces. In addition, an application and some illustrative examples are given in order to justify the validity and credibility of our results, also, their superiority over some similar theorems existing in unique common fixed points theory's domain.

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Key words and phrases. Metric space; dislocated metric space; occasionally weakly biased maps of type $(\mathcal{A})$; unique common fixed point theorems.

On Some New Generalized Dynamic Inequalities on Time Scales

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Abstract

In this paper, we discuss some new dynamic inequalities on time scales. In addition to improving some results achieved by using weak conditions, our results include some results proven in the literature that are inferred as limited cases. The main results are proved by using some algebraic inequalities, Hölder's inequality, and a simple consequence of Keller's chain rule on time scales. Our investigations unify and extend some continuous inequalities and their corresponding discrete analogues. In particular, as special cases we obtain integral inequalities on $\mathbb{T} = \mathbb{R}$($\mathbb{R}$ is the real numbers), q-integral inequalities on the specific time scales $\mathbb{T} = \overline{q^{\mathbb{Z}}} = \{q^z : z \in \mathbb{Z}\} \cup \{0\}$ where $q > 1$, discrete inequalities on the specific time scales $\mathbb{T} = h\mathbb{Z} = \{hz : z \in \mathbb{Z}\}$ and $\mathbb{T} = \mathbb{Z}$($\mathbb{Z}$ is the integer numbers).

AMS Subject Classifications: 26D10, 26D15, 34N05, 26E70..
Keywords: Dynamic inequalities, time scales calculus, chain rule on time scales, Fubini theorem, Hölder's inequality.

ON SOLUTIONS OF DIFFERENTIAL AND INTEGRAL EQUATIONS USING NEW FIXED POINT IN CONE E_b-METRIC SPACES

ZAHIA DJEDID, SHARIFA AL-SARIF, MOHAMMAD AL-KHALEEL, AND JAMILA JAWDAT

Abstract. The focus of this study is to establish the existence and uniqueness of solutions for differential and integral equations within specific metric spaces. Our investigation begins by introducing the concept of so-called cone E_b-metric space and presenting crucial findings in this particular space. We have presented fixed point results for specific contractions, particularly in the context of non-solid cones that possess semi-interior points. Not only do the results enhance specific previous fixed points outcomes, but they also encompass and extend previous findings documented in the literature. Furthermore, we apply our findings in the cone E_b-metric space to various examples and applications. The ultimate outcome is the rigorous validation of the existence and uniqueness of solutions for certain differential and integral equations.

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Key words and phrases. Integral equation, Initial value problem, Semi-interior point, b-metric space, Fixed point theory, cone E_b-metric space .

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ON THE BLOW-UP OF SOLUTIONS FOR A COUPLE OF PARABOLIC EQUATIONS WITH MEMORY TERMS AND VARIABLE EXPONENTS

AMAR OUAOUA

Abstract. In this paper, the focus is on investigating the asymptotic behavior of the solution for a system of parabolic equations with memory terms acting in both equations. This system has many applications in various scientific fields, including heat conduction in materials with memory effects and the study of biological systems exhibiting memory phenomena. The system of parabolic equations with a memory term provides a powerful framework for understanding and predicting the behavior of such complex systems, with emphasis on the role of the memory term in capturing the system's history-dependent behavior. Firstly, we assume that the relaxation functions $g(t) \geq h(t)$, $t \geq 0$. and, under certain conditions regarding the function $p(.)$, we prove that the solution with positive-initial-energy blows up in finite time. Finally, we present the previous theoretical results as numerical findings in the form of figures that illustrate and confirm the previous results by studying examples in two dimensions of space.

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Key words and phrases. Parabolic Equation, Source term, Memory term, Blow up.

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EXISTENCE RESULT FOR NONLINEAR FRACTIONAL DIFFERENTIAL SYSTEM WITH BOUNDARY CONDITIONS

OUARDA SAIFIA AND AMEL BOULFOUL

Abstract. The Banach contraction mapping principle and the Schaefer fixed point theorem are used in this manuscript to demonstrate the existence and the uniqueness of a solution for a coupled fractional differential system with boundary conditions. In addition, the proposed coupled system's Ulam's type stability is investigated. Finally, The analytical results are illustrated by an example.

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QUADRATIC DECOMPOSITION OF 2-ORTHOGONAL POLYNOMIALS SEQUENCES

FAGHMOUS CHADIA 1, KARIAMA ALI KHELIL 2,
AND MOHAMMED CHERIF BOURAS 3

Abstract. In this paper, we are interested of the quadratic decomposition of 2-monic orthogonal polynomials sequences (2− $MOPS$). We obtain the necessary and sufficient conditions for a monic polynomials sequence to be 2−orthogonal in terms of the sequences of the quadratic decomposition. Moreover, we obtain the links between the coefficients of the recurrence relation and the sequences of the quadratic decomposition. Also, we give necessary and sufficient conditions for its principal components to be orhogonal. Finally, characterising some particular cases of 2− $MOPS$.

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Key words and phrases. quadratic decomposition, monic orthogonal polynomials sequences, 2-Chebyshev MOPS, 2-symmetric MPPS..

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POSITIVITY OF PERIODIC SOLUTIONS FOR A CLASS OF FUNCTIONAL DELAY DIFFERENTIAL EQUATIONS

BENHADRI MIMIA

Abstract. In this work, the existence of positive periodic solutions for a class of functional delay differential equations is discussed by applying the Krasnoselskii's fixed point theorem. Some sufficient conditions are obtained to ensure the existence of single positive periodic solutions for the considered model. Finally, we exhibit an example to illustrate the applicability of the established results.

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Key words and phrases. Fixed point, Positive periodic solutions, Integral equations, Variable delays.

HOPF BIFURCATION OF THE COEXISTENCE EQUILIBRIUM AND STABILITY FOR A DIFFERENTIAL-ALGEBRAIC BIOLOGICAL ECONOMIC SYSTEM: PREDATOR HARVESTING

FEKRACHE ZINE EDDINE AND HOUMOR TAREK

Abstract. The current work aims to study the dynamics of a novel bioeconomic predator-prey system that solely relies on the predator's harvesting and the Holling type III response function. Because of the economic revenue, the system is outfitted with an algebraic equation. We present an in-depth mathematical examination of the suggested model in order to highlight some of the noteworthy findings. Analysis is done on the model's solutions' positivity and boundedness. The coexis- tence equilibria of the bioeconomic system have been deeply examined, and qualitative theory of dynamical systems—which includes concepts like local stability and Hopf bifurcation—is used to characterize the behaviors of the model surrounding them. The results produced offer a valuable framework for comprehending the function of economic revenue v. We demonstrate that when the product v is smaller than a specific critical value v_1^*, a positive equilibrium point is locally asymptotically stable; but, as the product increases, a loss of stability via Hopf bifurcation may transpire. Our research clearly shows that economic money has the power to stabilize the system and ensure the existence of all species. Lastly, a few numerical simulations have been run to support the analytical results.

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Key words and phrases. Harvesting, dierential-algebraic equation, stability, Hopf bifurcation.

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CONFORMABLE DERIVATIVE AND EVOLUTION EQUATION

ZINEB BELLABES AND BOUSSEKKINE NAIMA

Abstract. This paper systematically investigates semi-groups of bounded linear operators within the context of conformation derivation, specifically targeting abstract (semilinear) Cauchy problems. The primary aim is to establish the existence and uniqueness of mild solutions for these problems using the fixed point theorem. The study employs concepts from evolution equations and conformable fractional calculus to frame and solve the abstract Cauchy problem. By applying the fixed point theorem, the paper provides a rigorous proof of the existence and uniqueness of solutions, demonstrating how semi-groups can be effectively utilized in this abstract setting. The results offer significant insights into the behavior of mild solutions within the framework of semilinear equations and contribute to a deeper understanding of operator theory in fractional calculus. The findings not only advance theoretical knowledge but also have practical implications for solving complex problems in mathematical analysis. This research enriches the application of semi-groups to abstract Cauchy problems, thereby enhancing both theoretical and practical aspects of evolution equations and fractional calculus.

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Key words and phrases. evolution equation, conformable fractional calculus, semi-group..

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WELL-POSEDNESS AND GENERAL DECAY FOR A POROUS-ELASTIC SYSTEM WITH MICROTEMPERATURESEFFECTS AND TIME-VARYING DELAY TERM

FOUZIA FOUGHALI AND SALAH ZITOUNI

Abstract. In this paper, we study the well-posedness for a porous-elastic system with microtemperatures and a time-varying delay term in the internal feedback. We prove that the dissipation is strong enough to exponentially stabilize the system if the wave speeds are equal by introducing a suitable Lyapunov functional. Furthermore, we show that the system is polynomially stable provided that the wave speeds are not equal.

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GLOBAL ANALYSIS OF A MODEL OF COMPETITION IN CHEMOSTAT WITH INHIBITION

HAMIDI NABIL, DELLAL MOHAMED, AND LAKRIB MUSTAPHA

Abstract. A mathematical model of competition between plasmid-bearing and plasmid-free organisms for a single limiting resource in a chemostat with an inhibitor is analyzed. This model was previously introduced in a special case where the growth rate functions and the absorption rate of the inhibitor follow the Monod kinetics. Here, we consider the general case of monotonic growth functions. Through the operating parameters of the model, we give necessary and sufficient conditions for the existence and stability of all equilibria. By means of operating diagrams, we describe the asymptotic behavior of the model with respect to those operating parameters. Numerical simulations are carried out to illustrate the mathematical results

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PHASE PORTRAITS FOR A CERTAIN CLASS OF GENERALIZED POLYNOMIAL DIFFERENTIAL SYSTEMS

BENDIB EL OUAHMA

Abstract. Many authors studied the phase portraits of polynomial differential systems during the past years. The Poincaré disc $\mathbb{D}^2$ is the closed disc centered at the origin of the coordinates of $\mathbb{R}^2$. In this research, we give a classification for the phase portraits of a certain class of generalized polynomial differential systems.

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Key words and phrases. Phase portrait, polynomial differential systems, Poincaré disc.

EXISTENCE RESULTS FOR NONLINEAR FRACTIONAL DIFFERENTIAL INCLUSION

DJAMEL-EDDINE HETTADJ AND HABIB DJOURDEM

Abstract. In this papaer, we establish some existence results for higher-order nonlinear fractional differentiall inclusions with multi-strip conditions, when the right-hand side is convex-compact as well as nonconvex-compact values. First, we use the nonlinear alternative of Leray-Schauder type for multivalued maps. We investigate the next result by using the well-known Covitz and Nadler's fixed point theorem for multivalued contractions.

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Types of Presentation for a Conference (You can select one of these): Oral communication :Existence Results for Nonlinear Fractional Differential Inclusion.

status
Research professor: Habib DJOURDEM
PHD Student: Djamel-eddine HETTADJ

Key words and phrases. Differential inclusion, Caputo fractional derivative, multi-strip conditions, Covitz and Nadler fixed point theorem.

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A NUMERICAL SOLUTION FOR THE SINGLE-SERVER QUEUE WITH PHASE TYPE DISTRIBUTION SERVICE TIMES

LOUNES AMEUR

Abstract. The use of queuing models is a basic tool for studying systems involving contention for resources. Major application areas include computing systems, telecommunication systems, and manufacturing systems. Queuing models are important tools for studying the performance of complex systems, but despite the substantial queuing theory literature, it is often necessary to use approximations in the case the system is non-markovian. Phase type distribution is by now indispensable tool in creation of queuing system models.
In the majority of the cases, all model parameters are imprecisely known because they are determined through insu?cient statistical data (a finite number of observations). Leading to uncertainty in the assessment of their values. This parametric uncertainty induced from the incomplete information concerning the parameter is called "epistemic uncertainty".
This paper proposes a numerical approach based on Taylor series expansion with a statistical aspect for analyzing the stationary performances of the phase-type distributions single-server queues and ?nite orbit $(M/PH/1/N)$, where we assume that the parameter $\alpha = (\alpha_1, \alpha_2, \ldots, \alpha_n)$ of the service time is not assessed in a perfect manner. Additionally, approximate expressions of the probability density functions, the expectation and the variance of the performance measures are obtained and compared to the corresponding Monte Carlo simulations results.

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Key words and phrases. Queuing System Analysis, Phase Type Distribution, Sensitivity Analysis.

Types of Presentation for a Conference (You can select one of these):
Oral communication

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Research professor

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NUMERICAL ANALYSIS AND SIMULATION FOR A VISCOELASTIC WAVE EQUATION

YFRAH ABED AND REMIL MELOUKA

Abstract. In this paper, we study the 2D linear wave equation with dynamical control on the boundary. We use the Faedo-Galerkin method to prove the global existence of solutions. We show and analyze typical semi-discrete systems as well as an implicit fully discrete scheme. For both semi discrete and fully discrete methods, optimal a priori error estimates are demonstrated. Finally, some numerical findings and a priori error estimate are derived.

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Types of Presentation for a Conference: Poster

status: PHD Student

Subject: Abstract Submission ICRAPAM24-YFRAH

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Key words and phrases. finite element, viscoelastic, dynamic boundary conditions, fully discrete approximation.

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STABILIZATION AND REGULARITY OF A COUPLED SYSTEM

HALLOUZ ABDELHAMID AND MOHAMMED SAID SOUID

Abstract. First, we take into consideration a coupled system in a bounded domain that consists of the heat equation and the Schrodinger equation. An operator parametrized by a real number in the interval [0,1] is involved in the coupling. We demonstrate that the related semigroup is not consistently stable for $0 \leq \theta < 1$. Next, we put forth a certain non-uniform decay rate. We demonstrate that for $\theta = 1$ in this situation, the related semigroup is not analytic but exponentially stable.

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Keywords: Uniqueness, C_0-Semigroup, Frequency domain approach, Strong stability, Borichev and Tomilov.

Key words and phrases. Prtial equation Multigrid Solver, Fractional, Advection, Numerical.

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A CLASS OF AUTONOMOUS LIÉNARD DIFFERENTIAL SYSTEMS WITH AN EXPLICIT ALGEBRAIC LIMIT CYCLE

KINA ABDELKRIM

Abstract. n this work, we construct a model of Liénard differential systems and investigate the existence and uniqueness of an algebraic limit cycle, this limit cycle is explicitly given. To do this, we utilize two criteria of Giacomini, Chavarriga, et al ([8]) for examining the existence, nonexistence, and uniqueness of limit cycles.

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PHD Student.....

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WEAK SOLUTION FOR A CLASS OF $p(x)$-LAPLACIAN EQUATIONS

BOUNOUALA AMINA

Abstract. In this paper, we deal with the existence of a weak solution for a degenerate non-linear elliptic equation under the Dirichlet boundary condition of the forme

$$\begin{cases} -div(a(x)\,|\nabla u|^{p(x)-2}\,\nabla u) = \lambda f(x,u), & \text{in } \Omega \\ u = 0 & \text{in } \partial\Omega. \end{cases} \tag{0.1}$$

where,

$$-\Delta_{p(x)}u = -div(a(x)\,|\nabla u|^{p(x)-2}\,\nabla u)$$

which is called the $p(x)-$Laplacian operator, and f satisfies a Carathéodory condition.
We show the existence of a nontrivial weak solutions in $W_0^{1.p(x)}(a(x),\Omega)$. Our approach relies on the theory of the variable exponent Lebesgue and Sobolev spaces combined with adequate variational methods and a variation of the Mountain Pass lemma and critical point theory.

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Research professor.....×.....

Key words and phrases. Weighted Lebesgue-Sobolev spaces, Degenerate equation, eigenvalue, Weak solution.

PHD Student.....

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Study Existence, Stability and Exponential Stability of positive periodic solutions for dynamic equations.

Faycal Bouchelaghem

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Abstract: In this work, we use the Schauder's fixed point theorem to study the existence and stability of positive periodic solutions for delay nonlinear dynamic equation on time scales. The exponential stability of positive periodic solutions is also studied. Finally, we provide precise examples to illustrate this work.

Keywords:: Positive periodic solutions, Exponential stability, Schauder's fixed point theorem, Dynamic equations, Time scales.

Mathematics Subject Classification: 34K13, 34A34, 34K30, 34L30.

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SOME NEW RETARDED NONLINEAR VOLTERRA-FREDHOLM TYPE INTEGRAL INEQUALITIES ON TIME SCALES.

DIABI DALLEL

Abstract. We are devoted to studying a class of nonlinear delay Volterra–Fredholm type dynamic integral inequalities on time scales, which can be used as effective tools in the study of certain integral equations. Applications examples are also indicated.

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Types of Presentation for a Conference (You can select one of these):
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Key words and phrases. Time scale; Retarded integral inequality; Volterra-Fredholm type.

ASYMPTOTIC NORMALITY OF A NONPARAMETRIC ESTIMATOR OF THE CONDITIONAL DENSITY FUNCTION FOR FUNCTIONAL DATA

BENAOUDA OUM ELKHEIR AND MOHAMED KOUADRIA

Abstract. This study investigates the asymptotic properties of a nonparametric estimator for the conditional density function in the context of functional data analysis. We develop an estimator based on kernel methods and demonstrate its asymptotic normality. The results provide theoretical foundations for the use of nonparametric techniques in functional data contexts, particularly highlighting the estimator's convergence rates and distributional properties.

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Poster: Asymptotic Normality of a Nonparametric Estimator of the Conditional Density Function for Functional Data

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Key words and phrases. Asymptotic normality, Nonparametric estimator, Conditional density function, Functional data, Kernel methods.

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EXISTENCE OF POSITIVE RADIAL SOLUTION FOR SOME NONLOCAL ELLIPTIC PROBLEM

BELLAMOUCHI CHAHINEZ

Abstract. we prove existence of a positive radial solution to a multidimensional nonlocal elliptic problem under weak conditions on the reaction terms and the diffusion coefficients. We use Krasnoselskii's fixed point theorem.

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Types of Presentation for a Conference: Oral communication
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Key words and phrases. Nonlocal elliptic problem, Krasnoselskii's fixed point theorem, Reaction term, Diffusion coefficient.

EXPONENTIAL STABILIZATION OF THE FULL VON KÁRMÁN BEAM BY A THERMAL EFFECT AND A FRICTIONAL DAMPING AND DISTRIBUTED DELAY

LAMINE BOUZETTOUTA AND DJEBABLA ABDELHAK

Abstract. The one-dimensional full von Kármán beam is stabilized using the dissipative effect through heat conduction acting on the longitudinal component and the frictional damping acting on the transversal component of the beam.

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Key words and phrases. well-posedness, exponential stability, semigroup theory, Lyapunov functional.

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OPTIMAL CONTROL OF BILINEAR WAVE EQUATION WITH MISSING INITIAL CONDITION

FATMA ACHAB AND ABDELHAK HAFDALLAH

Abstract. This work is concerned with the optimal control of bilinear wave equation with incomplete data by the notion of the adapted low-regret control and no-regret control. We establish the existence, uniqueness and characterization of the no-regret control.

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Key words and phrases. Bilinear wave equation,Incomplete data, No-regret control.

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POSITIVE PERIODIC SOLUTIONS FOR NEUTRAL FUNCTIONAL DIFFERENTIAL SYSTEMS WITH ITERATIVE TERM

ELBAHI AMEL AND BENHADRI MIMIA

Abstract. We study the existence of positive periodic solutions of a system of neutral differential equations with term iterative. In the process we construct two mappings in which one is a contraction and the other compact. A Krasnoselskii's xed point theorem is then used in the analysis.

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Key words and phrases. Krasnoselskii, Neutral Functional di□erential System, Positive periodic solutions,

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ASYMPTOTIC NORMALITY OF KERNEL DENSITY ESTIMATORS FOR CENSORED ASSOCIATED DATA

SAIHI FERIAL, BOUKELOUA MOHAMED, AND LEULMI SARRA

Abstract. Density estimation is a classic statistical problem where initial methodologies established the properties of the proposed estimators under the assumption of data independence. However, this assumption is often violated in practice, as data can exhibit inherent dependency structures. This work addresses the concept of association, a form of dependency introduced by Esary et al. (1967) and further developed by Newmann (1984), Roussas (2000), Ferrani et al. (2014), and others. We review recent advancements in the asymptotic normality of kernel density estimators for censored associated data, extending the results of Ferrani et al. (2014) by establishing new findings on the asymptotic normality of these estimators under right-censoring conditions. In the first part of this presentation, We present the work done in Ferrani's thesis on asymptotic normality of the kernel density estimator defined by the following formula:

$$\hat{f}_n(t) = \frac{1}{nh} \sum_{j=1}^{n} \frac{\delta_j}{G_n(Y_j)} K\left(\frac{t - Y_j}{h}\right), \tag{0.1}$$

where K is a positive kernel function with integral 1, G_n is the Kaplan-Meier estimator of the cumulative distribution function G, and $h = h(n)$ is a sequence of positive real numbers satisfying $h \to 0$ as $n \to \infty$. We will begin by defining key concepts such as associated data, right-censored associated data, and the definition of asymptotic normality. We will then state the hypotheses, present the main results and their corollaries.

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Key words and phrases. Density Estimation, Association, Censored Data, Asymptotic Normality, Kernel Estimators.

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LIMIT CYCLES OF PERTURBED CUBIC UNIFORM ISOCHRONOUS CENTER VIA AVERAGING METHOD

NABIL REZAIKI AND AMEL BOULFOUL

Abstract. We study the number of limit cycles bifurcated from the periodic orbits of a cubic uniform isochronous center with continuous and discontinuous quartic polynomial perturbations. Using the averaging theory of first order for continuous and discontinuous differential systems and comparing the obtained results, we show that the discontinuous systems have at least 6 more limit cycles than the continuous ones. This study needs some computations that have been verified using Maple.

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Poster:...**X**.....

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PHD Student....**X**.....

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Key words and phrases. Averaging method, uniform isochronous center, limit cycle.

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ON NONLOCAL INTEGRAL AND DERIVATIVE BOUNDARY VALUE PROBLEM OF NONLINEAR LANGEVIN EQUATION

BERHAIL AMEL

Abstract. This paper investigates the fractional Langevin differential equation, which is subject to boundary conditions involving both fractional integrals and derivatives. We establish results on the existence and uniqueness of solutions to the proposed equation. Additionally, an example is provided to illustrate the consistency of the theoretical findings.

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Key words and phrases. Langevin equation, Boundary value problem, Banach contraction principle.

MAXIMUM NUMBER OF LIMIT CYCLES FOR A CLASS OF DIFFERENTIAL SYSTEMS VIA FOURTH-ORDER AVERAGING THEORY

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Abstract. We shall study the maximum number of limit cycles which can bifurcate from a zero–Hopf equilibrium point of a polynomial differential system in $\mathbb{R}^3$ with cubic homogeneous non-linearities using the averaging theory of the fourth-order. More precisely, we consider the differential systems of the form

$$\dot{x} = (a_1\varepsilon + a_2\varepsilon^2 + a_3\varepsilon^3 + a_4\varepsilon^4)x - (b + b_1\varepsilon + b_2\varepsilon^2 + b_3\varepsilon^3 + b_4\varepsilon^4)y + \sum_{j=0}^{2} \varepsilon^j X_j(x,y,z),$$

$$\dot{y} = (b + b_1\varepsilon + b_2\varepsilon^2 + b_3\varepsilon^3 + b_4\varepsilon^4)x + (a_1\varepsilon + a_2\varepsilon^2 + a_3\varepsilon^3 + a_4\varepsilon^4)y + \sum_{j=0}^{2} \varepsilon^j Y_j(x,y,z),$$

$$\dot{z} = (c_1\varepsilon + c_2\varepsilon^2 + c_3\varepsilon^3 + c_4\varepsilon^4)z + \sum_{j=0}^{2} \varepsilon^j Z_j(x,y,z),$$

where

$$\begin{aligned} X_j(x,y,z) \quad = \quad & a_{j0}x^3 + a_{j1}x^2y + a_{j2}x^2z + a_{j3}xy^2 + a_{j4}xyz + \\ & a_{j5}xz^2 + a_{j6}y^3 + a_{j7}y^2z + a_{j8}yz^2 + a_{j9}z^3, \end{aligned}$$

$Y_j(x,y,z)$ and $Z_j(x,y,z)$ have the same expression as $X_j(x,y,z)$ by replacing a_{ji} respectively by b_{ji} and c_{ji} for $j = \overline{0,2}$ and $i = \overline{0,9}$. The coefficients a_{ji}, b_{ji}, c_{ji}, a_1, a_2, a_3, a_4, b, b_1, b_2, b_3, b_4, c_1, c_2, c_3, c_4 are real parameters with $b \neq 0$. When $\varepsilon = 0$ the system has eigenvalues $\pm bi$ and 0 at the origin, i.e. the origin is a zero–Hopf equilibrium point.

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Key words and phrases. Zero–hopf bifurcation, Limit cycles, Averaging theory.

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ON CLASS $A^\sharp$ OPERATORS IN SEMI-HILBERTIAN SPACES

MUSTAPHA MAADANI AND ABELKADER BENALI

Abstract. Let $\mathcal{H}$ be a Hilbert space and let A be a positive bounded operator on $\mathcal{H}$. The semi-inner product $\langle u \mid v\rangle_A := \langle Au \mid v\rangle, \quad u, v \in \mathcal{H}$ induces a semi-norm $\|.\|_A$ on $\mathcal{H}$. This makes $\mathcal{H}$ into a semi-Hilbertian space. In this paper, we introduce a new class of operators called class $A^\sharp$ operator in semi-Hilbertian spaces. Some structural properties of this class of operators are established. An operator $T \in \mathcal{B}_A(\mathcal{H})$ is said to be class $A^\sharp$ if

$$T^{\sharp 2}T^2 \geq_A (TT^\sharp)^2$$

equivalently

$$A[T^{\sharp 2}T^2 - (TT^\sharp)^2] \geq 0$$

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Key words and phrases. Semi-Hilbertian space, A-positive, A-normal, Class A.

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EXISTENCE AND MULTIPLICITY OF SOLUTIONS FOR GJMS OPERATORS (K=2) ON NON-EINSTEIN MANIFOLDS

MOHAMED TOUATI AND HICHEM BOUGHAZI

Abstract. Let (M, g) be a smooth compact Riemannian manifold of dimension $n \geq 5$. Denote P_g^n the Paneitz-Branson operator. Is the case when $k = 2$ of C. Robin Graham, Ralph Jenne, Lionel Mason, and George Sparling. The acronym "GJMS" , we define the Paneitz-Branson invariants μ, μ_1. and We study when they are attained by a metric and this is equivalent to show the existence of positive solutions (and changing-sign solutions) to the nonlinear Paneitz-Branson equation

$$P_g^n u = C|u|^{N-2}u$$

where C is a certain constant and N is a critical exponent.

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PHD Student Mohamed Touati

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Key words and phrases. Fourth-order elliptic equation , Panieitz-Bransin operator, Eigenvalues.

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A NEW QUADRATIC EXPONENTIAL DISTRIBUTION WITH TWO-PARAMETER

FATMA ZOHRA BOUSSEBA, HALIM ZEGHDOUDI, AND MOHAMED KOUADRIA

Abstract. This paper presents a novel probability distribution, namely the new XLindley distribution, derived from a unique combination of exponential and gamma distributions through a special mixture formulation. The study extensively investigates the mathematical properties of the proposed distribution, including but not limited to the moment generation function, moments of different orders, mode identification, and the quantile function. Furthermore, the research employs a Monte Carlo simulation to assess and compare the performance of various estimators in estimating the unknown parameter of the new XLindley distribution. These estimators are carefully evaluated and analyzed in terms of their efficiency and accuracy, providing valuable insights into the practical application of the new distribution in statistical modeling and data analysis contexts. The voltage and failure time data in the field of engineering are used to model the proposed distribution. The new model is compared with many current distributions such as Xlindley, gamma, Weibull, exponential, Lindley, Shanker, Akash, Zeghdoudi, Chris-Jerry, and Xgamma. Among all models, it is concluded that the new one-parameter distribution performed the best in modeling based on criteria such as the Akaike information criterion, Bayesian information criterion, and others. The real data results show that the proposed distribution exhibits greater flexibility and improved goodness of fit compared to alternative distributions. The new XLindley distribution could be useful in modeling real-life data and may warrant further exploration in future research. Overall, this study contributes to the field of probability distributions and provides new insights for statistical modeling.

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Key words and phrases. Exponential distribution, Xlindley distribution, quantile function, estimation methods.

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Research professor yes

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The Use of Filippov's Strategy for the Study of a Fractional Differential Inclusions Problem

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Abstract. In this work we will give some conditions compatible with the Filippov's strategy to study the existence of solutions and its qualitative properties for a problem of fractional differential inclusions with delay.

Keywords: Filippov's strategy, fractional differential inclusions, qualitative properties, existence of solutions.

UNIT-ZEGHDOUDI DISTRIBUTION: PROPERTIES AND APPLICATION

MOHAMED KOUADRIA AND HALIM ZEGHDOUDI

Abstract. A large number of useful distributions for data analysis are obtained by transforming different random variables. An example is the unit-Zeghdoudi distribution, obtained by transforming a random variable that has a Zeghdoudi distribution. This paper introduces the Unit-Zeghdoudi distribution, which is useful for data analysis in the interval (0,1]. It has some interesting properties, such as closed-form expressions for moments in the exponential family. We also analyze a practical application with covariates by setting up a suitable regression, and we show that our model fits much better than both unit-Lindley and beta regressions.

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Key words and phrases. Distribution, Zeghdoudi Distribution, Unit-Lindley Distribution, Maximum Likelihood.

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STOCHASTIC PERTURBATION OF MATHEMATICAL MODELS IN POPULATION DYNAMICS

LALLOUCHE ABDALLAH

Abstract. In the last years, researchers of many areas in life sciences have been more and more interested in considering non-deterministic parameters in the mathematical models since it allows them to set up models, which are much more realistic. However, there are many different ways of introducing random or stochastic perturbations in deterministic models. The aim of this work is to examine the stability in probability of the equilibrium state of some mathematical models in population dynamics affected by stochastic perturbations that are assumed a sequence of independent random variables with zero mean, unit variance and these perturbations are proportional to the deviation of the system state.

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Key words and phrases. stochastic perturbations; stability in probability; asymptotic mean square stability, exponential form.

A MODIFIED QUASI-BOUNDARY VALUE METHOD FOR AN ABSTRACT ILL-POSED CAUCHY PROBLEM GOVERNED BY A DIFFERENTIAL-OPERATOR EQUATION OF FOURTH ORDER

KHELILI BESMA, BOUSSETILA NADJIB, AND BENRABAH ABDERAFIK

Abstract. In this study, we are concerned with the problem of approximating a solution to an ill-posed a Cauchy problem governed by a differential-operator equation of fourth order. By using the logarithmic convexity method, we establish the conditional well-posedness stability. In order to overcome the instability of the original problem, We propose a modified quasi-boundary value method to construct approximate stable solutions for the original ill-posed boundary value problem. Some other convergence results are also established under a priori-bound assumptions on the exact solution. Moreover, Numerical tests are presented to illustrate the accuracy and efficiency of this method.

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Key words and phrases. Ill-posed Problems, Regularization, Conditional stability, A posteriori parameter choice.

Von Kàrmàn Equations with Infinite Memory

Hamdi Zakaria

ABSTRACT : In this study, we investigate the Von Kármán delayed system with infinite memory as a natural damping term. The well-posedness result is established through a semigroups approach. Under specific assumptions on the delay parameters, we demonstrate that the dissipation resulting from the memory effect stabilizes the system, proving exponential decay for exponential relaxation functions.

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Types of Presentation for a Conference):
Oral communication

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Research professor

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Key words and phrases. Metric space; dislocated metric space; occasionally weakly biased maps of type ($\mathcal{A}$); unique common fixed point theorems.

ON THE MAXIMUM NUMBER OF LIMIT CYCLES OF KUKLES POLYNOMIAL DIFFERENTIAL SYSTEMS

NASSIMA DEBZ

Abstract. In this work, we are intersted in the study of the limit cycles that can bifurcate from a linear center, when perturbed inside a class of polynomial differential systems. Using averaging theory of first and second order, we estimate the maximum number of the limit cycles that this class can exhibit.

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NON-EXISTENCE OF LIMIT CYCLE OF SEPTIC KOLMOGOROV SYSTEM

RIMA CHOUADER 1 AND AHMED BENDJEDDOU 2

Abstract. There are many natural phenomena which can be modeled the Kolmogorov systems such as mathematical ecology and population dynamics, chemical reactions, hydronamics, economics, etc. In this work, we study a class of Septic Kolomgorov systems of the form :

$$\begin{cases} x' = (x+p)\,P_6\,(x,y) \\ y' = (y+q)\,Q_6\,(x,y) \end{cases} \tag{0.1}$$

where

$$\begin{aligned} P_6\,(x,y) &= \begin{pmatrix} x\,(q+y)\left(ax^4+ay^4+2bxy^3+2bx^3y\right) \\ +cx(x+p)(q+y)^2+\left(x^2+y^2\right)\left(-4qy^3+x^4-3y^4\right) \end{pmatrix} \\ Q_6\,(x,y) &= \begin{pmatrix} y\,(p+x)\left(ax^4+ay^4+2bxy^3+2bx^3y\right) \\ +cy(q+y)(x+p)^2+\left(x^2+y^2\right)\left(4px^3-y^4+3x^4\right) \end{pmatrix} \end{aligned}$$

and p, q, a, b, c are real numbers. We show that our system exhibiting an explicit expression of first integral. Moreover, according to certain conditions on the parameters the system admits a non algebraic limit cycle which can be explicitly given. We give an example to illustrate this proved result.

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Oral communication :Yes.....
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Research professor: No.....
PHD Student: Yes.....

Key words and phrases. kolmogorov systems, first integral, limit cycle.

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LIMIT CYCLES FOR GENERALIZATION OF POLYNOMIAL LIÉNARD DIFFERENTIAL SYSTEMS

MELLAHI NAWAL

Abstract. We apply the averaging theory of first and second order for studying the limit cycles of generalized polynomial Liénard systems of the form

$$\dot{x} = y, \quad \dot{y} = -x - f(x) - g(x)y - h(x)y^2 - l(x)y^3,$$

where $f(x) = \epsilon f_1(x) + \epsilon^2 f_2(x)$, $g(x) = \epsilon g_1(x) + \epsilon^2 g_2(x)$, $h(x) = \epsilon h_1(x) + \epsilon^2 h_2(x)$ and $l(x) = \epsilon l_1(x) + \epsilon^2 l_2(x)$ where $f_k(x)$, $g_k(x)$, $h_k(x)$ and $l_k(x)$ have degree n for each $k = 1, 2$, and ϵ is a small parameter. Note that when $l(x) = h(x) = 0$, we obtain the generalized polynomial Liénard systems.

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Key words and phrases. Limit cycle, Averaging theory, Liénard systems .

LEAST-SQUARES CROSS-VALIDATION BANDWIDTH SELECTION FOR KERNEL DISTRIBUTION FUNCTION UNDER DOUBLE TRUNCATION DATA

ROUMAISSA ELBAY AND YAHIA DJABRANE

Abstract. In recent years, estimating the distribution function under double truncation has become an attractive topic in scientific research. Double truncation is situation when the observation is known if it inside interval due to this there other observations are lost. In this paper, we propose a bandwidth selector estimator for kernel distribution function. Our method aims to give solution of estimating in presence double truncation data, as we all know working in this kind of data need special mechanisms for providing a robust approach for modeling and estimating the distribution. We present theoretical foundations of our bandwidth.

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Poster: Yes

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Key words and phrases. Double truncation, Bandwidth, Cross validation, The NPMLE..

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AN ADVANCED COMPUTATIONAL APPROACH THROUGH THE INTEGRATION OF CUBIC B-SPLINE METHOD FOR THE RESOLUTION OF A NON-LINEAR WAVE EQUATION

KELTHOUM LINA REDOUANE AND NOURIA ARAR

Abstract. In this communication, we look at a Galerkin-type approximation method for solving the Wave equation with homogeneous boundary conditions. Our solution uses a framework of cubic B-splines to satisfy the boundary restrictions and accurately implement the Galerkin approximation. We improve temporal precision by employing a higher-order difference approach for time discretization. We tested our approach in various situations and compared the results to analytical and numerical solutions from academic literature to validate it. Our findings show that this method has excellent computing efficiency and accuracy, beating other numerical methods. The practical applications and prospects for future study will be explored, emphasizing the robustness and versatility of our technique for solving complex wave equations. Numerical methods are computational tools for approximating solutions to complicated mathematical problems that cannot be solved analytically. These techniques are critical for modeling and simulating physical events, optimizing engineering designs, and analyzing data.

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PHD Student

Key words and phrases. Wave Equation, Nonlinear Equation, Cubic B-Splines, Finite Differences, Galerkin-Type Approximation.

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GENERAL DECAY OF THE VISCOELASTIC EULER-BERNOULLI EQUATION WITH LOGARITHMIC NON LINEARITY

BILEL MADJOUR AND AMEL BOUDIAF

Abstract. By using the technique of energy decay and some properties of convex functions, we establish the general decay rate of the solution energy for the Viscoelasric Euler-Bernoulli Equation with Logarithmic Non linearity in the right-hand side

(0.1)
$$\begin{cases} u_{tt} + \Delta^2 u - \int_0^t g(t-s)\,\Delta^2 u(s)\,ds = |u|^{\gamma-2}\,u \ln|u|, & \text{in } \Omega \times (0,\infty), \\ u = 0, & \text{on } \partial\Omega \times (0,\infty), \\ \mathcal{B}(u) - \mathcal{B}\left(\int_0^t g(t-s)\,u(s)\,ds\right) = 0, & \text{on } \partial\Omega \times (0,\infty), \\ u(0) = u_0,\ u_t(0) = u_1, & x \in \Omega, \end{cases}$$

where $\gamma > 2, \Omega$ is a bounded domain of $\mathbb{R}^2$, and the relaxation function g satisfies $g'(t) \leq -\xi(t)\,H(g(t))$, where H is an increasing and convex function near the origin and $\xi(t)$ is a positive nonincreasing function, from which the usual exponential and the polynomial decay are only special case of our result. The differential operator $\mathcal{B}$ is denoted as follows:

$$\mathcal{B}u = \Delta u + (1-\nu)\,Bu, \tag{0.2}$$

where

$$Bu = 2\tau_1\tau_2 \frac{\partial^2 u}{\partial x_1 \partial x_2} - \tau_1^2 \frac{\partial^2 u}{\partial x_1^2} - \tau_2^2 \frac{\partial^2 u}{\partial x_2^2}. \tag{0.3}$$

and Poisson coefficient is equal to ν with $\nu \in \left(0, \frac{1}{2}\right)$.

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Key words and phrases. Viscoelasticity, Convex function, Logarithmic nonlinearity, Relaxation function.

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QUALITATIVE BEHAVIOUR OF SOME BIOLOGICAL MATHEMATICAL MODELS

LALLOUCHE ABDALLAH

Abstract. Mathematical modelling have been extensively investigated as they are capable of depicting a multitude of real-life issues in fields such as biology, ecology, economics, physics, and the like. Over the last few years, the mathematicians have shown a lot of interest on studying the behaviour of the non-linear differential and difference equations and systems. These studies have been very productive and helpful to develop the basic theory of the qualitative behaviour of biological models. The aim of this work is to study the boundedness and local and global asymptotic behaviour of the solutions of some biological mathematical models with positive parameters and positive initial conditions. Numerical simulations are provided to show effectiveness of theoretical discussion.

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Key words and phrases. local asymptotic stability, boundedness, global asymptotic stability, Equilibrium.

Well-posedness of a nonlinear interface problems of a multiphase multicompenent model

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Abstract
Biofilms form when bacteria adhere to surfaces and produce polysaccharides, creating an extracellular polymeric matrix (EPS). To model biofilm growth accurately, one must consider bacteria, EPS, and solvents within the biofilm region $\Omega(t)$, as well as those in the surrounding region $D(t)$. The interface $\gamma(t)$ between these regions acts as a free boundary. This study introduces a mathematical model comprising Stokes equations for EPS with attached bacteria, as well as for solvents within $\Omega(t)$ and $D(t)$. Additionally, a reaction-diffusion equation governs the volume fraction of EPS. The system is nonlinearly coupled within and across the free surface $\Omega(t)$. The paper establishes the existence and uniqueness of a solution, featuring a smooth surface $\Omega(t)$, over a small time interval.

Keywords: nonlinear interface problems, multiphase, existence and uniqueness of a solution.
2020 Mathematics Subject Classification: 35R35, 35L45, 35BXX, 92B05.

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A GLOBAL OPTIMIZATION APPROACH USING α-DENSE CURVES

NOUR EL ISLAM HIBER AND D. GUETTAL

Abstract. In this paper, we employ the Evtushenko algorithm, a global optimization method, to address multi-modal optimization problems. Firstly, we use the reducing dimension technique using space-filling curves. Secondly, we apply the Evtushenko approach to the reduced problem. We demonstrate that the proposed method shows finite convergence to the global optimum.

Types of Presentation for a Conference (You can select one of these):
Oral communication: ×.
Poster:.....

status
Research professor: .....
PHD Student: ×.

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UN PROBLÈME D'ÉVOLUTION AVEC OBSTACLE PAR DÉCOMPOSITION DE DOMAINE SANS RECOUVREMENT

A. HANNACHE

Abstract. Les problèmes de l'obstacle constituent une catégorie très importante des problèmes non linéaires; ces problèmes ont été largement étudiés d'un point de vue théorique et numérique par Lions et Glowinski et d'autres, et sont généralement rencontrés dans divers domaines: la mécanique la physique, l'économie le contrôle optimale,etc...
Dans ce travail, on s'intéresse au problème d'évolution parabolique avec obstacle de type contrainte unilatérale avec condition aux limites Dirichlet.on transforme le problème en deux sous problèmes découplés de taille plus petite qui peuvent être résolu en parallèle. On applique la technique de décomposition de domaines sans recouvrement de type optimisation, avec multiplicateur de Lagrange associée à la méthode de pénalisation .
pour la résolution numérique on discrétise le problème par différences finis et on utilise une méthode itérative .

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Key words and phrases. Méthode de décomposition de domaine; algorithme itératif, Pénalisation.

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ON THE PROBABILISTIC STRUCTURE OF SOME SBL MODELS

KARIMA KIMOUCHE

Abstract. In this paper, we deal with the frequency domain method, i.e., using the Wiener-Ito spectral representation, to describe some probabilistic properties of different representations of BL models, as this method was shown more informative. So, we give a necessary and sufficient condition for the regular second order stationarity. It is shown that the spectrum characterizes only the linear part of these representations, therefore it is necessary to use the third order properties, i.e., the bispectrum for the identification.

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Poster:.....YES.....

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Key words and phrases. SBL models, Transfer function, Stationarity, Spectrum.

Numerical Combination of Anisotropic and Isotropic TV Denoising Problems

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Abstract

In this paper, we present numerical results obtained by numerically combining anisotropic and isotropic TV denoising problems. The anisotropic TV denoising algorithms give us better processed images, but in a longer time. As for the isotropic TV denoising algorithms, they provide a lower-quality image, but in a faster time. Therefore, we combined the two models to get a good-quality image in a shorter period of time. We put the image obtained from the program algorithm TV isotropic on the data of the program algorithm TV anisotropic to work on it to get the best results. Indeed, we obtainedimages of the best quality in a short period of time (clean, not smooth, and textures were preserved).

Keywords: Algorithms, Application, Image restoration, Image processing, comparative study.

MSC Classification: Primary 68W40 , Secondary 65K05 , 65Z05 , 65S99.

ENERGY DECAY RESULT OF THERMOELASTIC SYSTEM BY MICROTEMPERATURE EFFECTS

M.HACHELFI AND A.DJEBABLA

Abstract. In this paper, we study the asymptotic behaivor of solutions for the porous thermoelastic system with temperature and microtemperature effects. Our main result is to prove the exponential stability, and this by applying the multiplier method to build some very delicate Lyapunov functionals.

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Key words and phrases. Exponential Decay, Lyapunov Functiona, Multiplier Method, Microtemperature Damping.

ROBUST METHODS FOR APPROXIMATING SOLUTIONS TO STOCHASTIC INTEGRAL EQUATIONS

REBIHA ZEGHDANE

Abstract. The aim of this work is to introduce a numerical method for approximating solutions of stochastic differential equations using the collocation method. This method serves as a powerful numerical technique for solving stochastic differential equations (SDEs). By selecting specific collocation points and establishing a system of algebraic equations, it effectively approximates the solution of SDEs. This technique is particularly valuable in fields characterized by uncertainty, such as quantitative finance and population dynamics. Through careful selection of collocation points and rigorous numerical procedures, the collocation method yields accurate solutions while maintaining computational efficiency, making it an essential tool for modeling and analyzing stochastic equations.

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Key words and phrases. Stochastic integral equation, collocation method, numerical solution, orthogonal polynomials, convergence analysis.

AN INVERSE SOURCE TIME-FRACTIONAL DIFFUSION PROBLEM VIA AN INPUT-OUTPUT MAPPING

LOUBNA SETTARA[1] AND RAHIMA ATMANIA[2]

Abstract. *In this paper, a unique solution to an inverse source problem for a one-dimensional time-fractional diffusion equation is obtained as a convergent series. This existence and uniqueness result is based on the Fourier method, the fractional calculus and the Banach fixed point principle. The unknown source coefficient is determined uniquely by the additional data which is an integral condition. Then, the continuous dependence of data is proved.*

Keywords: Time-fractional diffusion equation, fractional derivative, inverse problem, bi-orthogonal system of functions, Fourier series, Banach fixed point theorem.

2000 Mathematics Subject Classification: 80A23, 65N21, 26A33, 35R30.

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Asymptotic behaviour of evolution problem in a perforated domain

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Abstract

We study the asymptotic behaviour of a class of Hyperbolic-Parabolic problem in a perforated domain in $\mathbb{R}^{\mathbb{N}}, N \geq 3$, with small holes ε-periodically distributed. The size of the holes is of the order $(\varepsilon\delta(\varepsilon))$ with $\delta(\varepsilon) \longrightarrow 0$ as ε goes to zero. On the boundary of some holes we prescribe a Dirichlet condition condition, on the boundary of the others, a Robin condition condition depending on a parameter γ is assumed . We focus on the homogenization of these equations, which generalizes those achieved by Z. Yang, X [3]. Zhao To do so, we use the periodic unfolding method introduced by Cioranescu, Damlamian and Griso in [1] and [2].

Keywords: Hyperbolic-Parabolic Equations, periodic unfolding, small holes,

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EXISTENCE RESULTS FOR A NONLINEAR (P(X),Q(X))-ELLIPTIC SYSTEM VIA TOPOLOGICAL DEGREE

SAMIRA LECHEHEB

Abstract. In this work, we study the existence of a distributional solution for a strongly nonlinear (p(x),q(x))-elliptic system. By means of the Berkovits degree theory, with suitable assumptions on the nonlinearities, we establish the existence of nontrivial solution to our problem.

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Key words and phrases. Topological degree, Strangly nonlinear elliptic system, p(x)-Laplacian, Generalized Lebesgue and Sobolev spaces .

WELL-POSEDNESS AND EXPONENTIAL STABILITY OF THE KDV EQUATION WITH TIME-DELAY

CHAHNAZ TIMIMOUN

Abstract. In this work we consider a nonlinear Korteweg-de Vries equation with a time-dependent delay in a bounded domain. We study the well-posedness of the system and the exponential stability with time-dependent delay under some assumptions on the dampings and the delay.

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Key words and phrases. KdV equation, Energy, Lyapunov functional, time-delay.

EXISTENCE RESULT FOR NONLINEAR IMPLICIT FRACTIONAL DIFFERENTIAL EQUATIONS WITH NON-INSTANTANEOUS IMPULSES UNDER CAPUTO-FABRIZIO DERIVATIVE

BENZAHI AHLEM, ABADA NADJET, AND ARAR NOURIA

Abstract. In this research, we have established the existence of solutions for a specific class of nonlinear implicit fractional differential equations characterized by non-instantaneous impulses and defined using the Caputo-Fabrizio fractional derivative. This derivative captures non-local and memory-dependent effects in the behavior of the system under study. To derive the existence outcome, we employed Darbo's fixed point theorem in conjunction with Kuratowski's measure of noncompactness, rigorously proving the existence of solutions within this context. Our findings highlight the adaptability and robustness of these mathematical techniques for addressing complex problems involving non-instantaneous impulses and memory-dependent effects. This work not only advances the theoretical understanding of fractional differential equations with the Caputo-Fabrizio derivative but also provides a solid foundation for future studies exploring similar systems.

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Key words and phrases. Fractional differential equations, Caputo-Fabrizio fractional derivative, Non instantaneous impulse, Measure of noncompactness, Fixed point theorem.
MSC: 26A33, 34A12, 34A37, 35A01.

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Generating Probability Densities Using the Modified Poisson Process

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Abstract: The Poisson New XLindley process is introduced as a novel extension of the non-homogeneous Poisson process, with a focus on generating probability densities using this modified approach. Its mathematical properties are explored, and a new counting process model is developed. Additionally, a comparative analysis with the classical Poisson process is presented, employing a continuous-time ruin model to demonstrate the advantages in financial risk modeling. The anticipated results will highlight the enhanced capabilities of the Poisson New XLindley process in real-world applications.

Keywords: Stochastic processes, Poisson NXLindley process, Stochastic properties,Compound Poisson, NXLindley process.

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SOME PROPERTIES OF NON NORMAL OPERATOR ON HILBERT SPACES

AYYOUB FELLAG ARIOUAT AND AISSA NASLI BAKIR

Abstract. In this work,we are going to show certain basic proprties of some classes of non-normal operators defined on a infinite complex-separable Hilbert space. also,we will provide the reader ,the decomposition restriction and the ascent of such operators on invariant subspaces and some spectral properties .

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Key words and phrases. m-isometry , quasinormal operator of order n , finite descent , finite ascent .

BOUNDEDNESS OF SOME SUBLINEAR OPERATORS ON WEAK HERZ SPACES WITH VARIABLE EXPONENTS

H. B. BOULARES[1], D. DRIHEM[2], AND W. HEBBACHE[3]

Abstract. The aim of this paper is twofold. First, we give a new quasi-norm equivalents of the variable weak Herz spaces $WK^{\alpha(\cdot)}_{p(\cdot),q(\cdot)}$ and $W\dot{K}^{\alpha(\cdot)}_{p(\cdot),q(\cdot)}$. Secondly, we use these results to prove the boundedness properties of sublinear operators on these spaces.

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Key words and phrases. Sublinear Operators, Weak Herz Spaces, Variable Exponents.

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STANDBY REDUNDANCY IN REPAIRABLE SYSTEMS WITH GENERAL REPAIR TIMES

BOUDEHANE KHEIREDDINE AND TALEB SAMIRA

Abstract. The aim of this paper is to study the performance of a $K-out-of-M+W+C:G$ retrial system with a single repairer through a Markov regenerative Stochastic Petri Net ($MRSPN$). The system is equipped with M primary operating components, W warm standby components, and C cold standby components. The lifetimes of primary components and warm standby components are assumed to be exponentially distributed random variables. When a component fails, it is either repaired immediately if the repairer is available and free, or it enters a retrial orbit if the repairer is busy. Repair times are assumed to be random variables following a general distribution. We use the $MRSPN$ model to derive the system's main stationary probabilities and some performance reliability measures.

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Key words and phrases. Prtial equation Multigrid Solver, Fractional, Advection, Numerical.

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ON PERIODIC SOLUTIONS FOR A CLASS OF SECOND-ORDER DIFFERENTIAL EQUATIONS VIA AVERAGING THEORY

AFEF AMINA RABIA AND AMAR MAKHLOUF

Abstract. Averaging theory plays an important role in understanding complex systems, while the Duffing equation is a key model for nonlinear oscillations in various physical contexts. In this study, based on averaging theory, we provide sufficient conditions for the existence of periodic solutions for a class of second-order differential equations given by

$$\ddot{x} + c(t)\dot{x} + g(t,x) = p(t),$$

where $c(t)$, $g(t,x)$, and $p(t)$ are $\mathcal{C}^2$ functions that are T-periodic in the variable t. This formulation generalizes several classes of Duffing differential equation.

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Key words and phrases. Periodic solutions, Averaging theory, Duffing differential equation.

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A VARIANT OF THE WEIGHTED QUASI-BOUNDARY VALUE METHOD FOR AN ABSTRACT FRACTIONAL GENERALIZED ELLIPTIC CAUCHY PROBLEM

SELMANI WISSAME AND BOUSSETILA NADJIB

Abstract. In this study, we are concerned with the problem of approximating a solution to an ill-posed fractional elliptic Cauchy problem. In order to overcome the instability of the original problem, We propose a modified quasi-boundary value method to construct approximate stable solutions for the original ill-posed boundary value problem. We give the convergence of this regularizing strategy, and we present some numerical tests to illustrate the accuracy and efficiency of this method.

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Key words and phrases. Ill-posed Problems, Regularization, Conditional stability, A posteriori parameter choice.

ON BAYESIAN BONUS-MALUS PREMIUM UNDER LINEX LOSS FUNCTION WITH APPLICATIONS

OUCHEN IMENE, SADOUN AHMED, METIRI FAROUK, AND REMITA MOHAMED RIAD

Abstract. The majority of bonus-malus systems (BMS) determine the premium for each policyholder solely based on their claim frequency. Adopting this method would be unjust. A driver who files a claim for small damage cannot be subjected to the same penalties as a driver responsible for a claim involving significant damage. To achieve a balance in the portfolio between good and bad drivers, a new portion of the premium is computed as a compromise. To do this, the claim severity is created and assessed to provide a fair premium. The consideration was determined by taking into account both the quantity and magnitude of the claims. This work assumes that the frequency of claims follows a Poisson-Akash distribution, but the severity of claims follows a newly proposed distribution known as the Inverse-Gamma Lindley distribution. The bonus-malus premiums were computed using the Bayesian approach for both the frequency and severity of claims. The premium is computed using the asymmetric Linex loss function for both the frequency and severity of claims in the bonus-malus system. Illustrative instances utilizing an actual dataset for the application of BMS are presented, showcasing the use of claim frequency alone and the combination of claim frequency and claim severity. The R software is employed for these demonstrations. We concluded this paper with a discussion comparing the premiums obtained in each case.

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Key words and phrases. Bonus-Malus System, Poisson-Akash distribution, Inverse-Gamma Lindley distribution, Bayesian premium, Linex loss function.

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EXISTENCE AND REGULARITY RESULTS FOR AN ELLIPTIC SYSTEM WITH MIXED BOUNDARY CONDITIONS

IMANE BOUSSETOUAN AND CHÉRIF AMROUCHE

Abstract. In this work, we are concerned with an elliptic system involving nonstandard mixed boundary conditions in a bounded domain, possibly multiply connected. We consider the Poisson equation with Navier-type boundary condition on some part of the boundary and a non tangential condition together with a free divergence condition on the remaining part. For the well-posedness of the problem, a quantity that reflects the topological structure of the domain is added. We prove the existence and uniqueness of weak and strong solutions of such problem in the Hilbert setting. Then, we generalize our results to the L^p-theory by virtue of some Inf-Sup conditions.

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status
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Key words and phrases. Poisson equation, Navier condition, mixed boundary conditions, strong solutions, L^p theory.

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CHARACTERISTICS AND UTILIZATIONS OF THE MODIFIED BIVARIATE POISSON-LINDLEY APPROACH IN SOCCER

HADDARI ALLAEDDINE, ZEGHDOUDI HALIM, AND VINOTH RAMAN

Abstract. This work introduces the bivariate Poisson-new XLindley distribution (BPNXLD), applicable for modeling dependent and over-dispersed count data. The parameters examined are the correlation coefficient, mean, and variance of the distribution. A comparison of several bivariate distributions is presented. The goodness of fit of this new model is evaluated against the bivariate Poisson, bivariate negative binomial, and bivariate Poisson-Lindley distributions. We employed two data sets from a German Bundesliga season.

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Key words and phrases. Poisson-New Xlindley distribution, Bivariate Poisson-Lindley distribution, Estimation, Soccer data set.

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ON CONVOLVED GENERALIZED FIBONACCI AND LUCAS POLYNOMAILS

RABAH MEBDOUA AND BOUALEM SADAOUI

Abstract. We define the convolved $h(x)-$Fibonacci polynomials as extension of the classical convolved Fibonacci numbers.then we give some cobinatorial formulas involving the $h(x)-$Fibonacci and $h(x)-$Lucas polynomials.Moreover we obtain the convolved $h(x)-$ Fibonacci polynomial from family of Hessenberg matrices.

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Key words and phrases. fibonacci polynomail, convolved polynomails , polynomail lucas ,fibonacci number , lucas number .

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A STABILITY RESULT FOR A NONAUTONOMOUS DELAYED VISCOELASTIC WAVE EQUATION.

MARWA DJEMOUI, HOURIA CHELLAOUA, AND YAMNA BOUKHATEM

Abstract. In the study of viscoelastic wave equations, the nonautonomous case presents special difficulties and complications. The study of these types of systems requires determining if solutions exist and how they behave asymptotically. Our focus is on the next nonautonomous viscoelastic wave equation with linear damping and delayed terms:

$$u_{tt}(x,t) - a(t)\Delta u(x,t) + \int_0^\infty g(s)b(t)\Delta u(x,t-s)ds + \mu_1 u_t(x,t) + \mu_2 u_t(x,t-\tau) = 0, \quad x \in \Omega,\ t > 0,$$

where Ω is a regular domain of $\mathbb{R}^n$, $a, b : \mathbb{R}_+ \to \mathbb{R}_+^*$ are given functions of class C^1, μ_1 is a positive constant and μ_2 is a real number. We prove global existence by using the theory of semigroups under appropriate assumptions. Furthermore, we obtain a stability result through a suitable Lyapunov function, where the decay of the kernel function is exponential and the coefficient of delay is small enough.

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Key words and phrases. Energy decay, global existence, lyapunov functional, viscoelastic wave equation, delayed term.

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A SECURE COMMUNICATION SCHEME BASED ON ADAPTIVE HYBRID SYNCHRONIZATION OF FRACTIONAL-ORDER HYPERCHAOTIC SYSTEMS

HANECHE NABIL

Abstract. In recent years, there has been great interest in the study of chaotic dynamical systems in the literature. Chaotic systems have many applications in practice, in particular in physics, chemistry, neural networks, cryptography, and secure communication. In this paper, an adaptive control scheme has been introduced to achieve synchronization between two different fractional-order hyperchaotic systems with unknown parameters. The controller was designed based on Lyapunov stability theory using rigorous fractional calculus techniques. The adaptive hybrid synchronization between fractional-order hyperchaotic Lorenz and Chen systems has evolved to illustrate the constructed synchronization scheme. In order to create high security for signal transmission, an application of synchronization in secure communication based on the chaotic masking technique has been performed. In this method, the message signal is injected into one of the hyperchaotic transmitter system's state variables, and the combined signal is then transmitted through the channel to the hyperchaotic receiver one. Finally, when the transmitter and receiver systems are synchronized, the message can be successfully recovered at the receiver. Computer simulations were carried out to validate the theoretical results derived from this research paper.

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Key words and phrases. Fractional-order, Hyperchaotic system, Adaptive hybrid synchronization, Secure communication.

Research professor: No
PHD Student: Yes

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Simulation of Burr-Hatke exponential distribution in R

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Abstract

The aim of this work is to provide for different sample sizes, tables of critical values of the goodness-of-fit tests, such as the Kolmogorov-Smirnov test, Cramer-Von Mises test and Anderson–Darling test for the new Burr-Hatke exponential (BHE) distribution, which is used to write software reliability. The power of these statistics is studied using some alternatives such as the exponential, the exponentiated exponential and the exponential Weibull. All calculations are performed using R software and the Monte Carlo method.

Key Words: New Burr-Hatke exponential (BHE) distribution; modified Kolmogorov-Smirnov test; Cramer-Von Mises test; Anderson–Darling test.

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BIFURCATION ANALYSIS AND STABILITY IN A DISCRETE-TIME SIRS MODEL: INSIGHTS FROM THE COVID-19 PANDEMIC IN THE USA

MOHAMED CHERIF BELILI AND MOHAMED LAMINE SAHARI

Abstract. This study investigates the dynamic behavior of an SIRS epidemic model in discrete time, given by

$$\begin{cases} \dfrac{dS}{dt} = A - \mu S - \lambda SI + \beta R, \\ \dfrac{dI}{dt} = \lambda SI - (\mu + r)I, \\ \dfrac{dR}{dt} = rI - (\mu + \beta)R, \\ N(t) = S(t) + I(t) + R(t). \end{cases}$$

where $S(t)$, $I(t)$, $R(t)$, and $N(t)$ denote the numbers of susceptible, infective, recovered individuals, and total numbers of the individuals at time t , respectively. A is the recruitment rate of the population, μ is the natural death rate of the population, r is the recovery rate of the infective individuals, λ is the bilinear incidence rate, and β is the rate of loss of immunity. Concentrating mostly on mathematical analysis. We distinguish between two equilibrium points: endemic and disease-free, with the stability of the endemic state being our main focus. Using data from the US Department of Health and optimizing [1], the SIRS model, we estimate model parameters and analyze two types of bifurcations: Flip and Transcritical. Bifurcation diagrams and curves are presented, employing the Carcasses method [1,2] for the Flip bifurcation and an implicit function approach for the Transcritical bifurcation.

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Oral communication : **Yes**

Key words and phrases. Flip bifurcation, Transcritical bifurcation, bifurcation curve, discrete epidemic model, stability,numerical simulation..

Poster: /

status
Research professor: /
PHD Student: **Yes**

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A STABILITY STUDY OF THE SOLUTIONS OF A POROUS WITH FRACTIONAL TIME DELAYS

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Abstract

In this work, we are concerned with a porous problem in a bounded one-dimensional domain under Dirichlet boundary conditions with fractional time delays and internal frictional dissipative terms. By a multiplier approach, an exponential stability result are obtained.

Keywords: Timoshenko problem; Fractional time delays; Exponential stability.

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Applying feedback control to full synchronize two different chaotic systems with unknown characteristics

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Abstract

In this study, we introduce the full synchronization of two distinct chaotic systems with unknown parameters. An adaptive control strategy, rooted in the Lyapunov stability theorem, is developed to facilitate full synchronization between these chaotic systems. This approach allows for achieving full synchronization in nearly all chaotic systems. While the models in the research have unknown parameters, the method is equally applicable and significant for systems with known parameters. To accurately verify the effectiveness of the design scheme and support the theoretical results, an illustrative example is presented with numerical simulations. The proposed example demonstrates full synchronization between two different chaotic systems: the Lu system and the Zeraoulia system.

Keywords: adaptatif Contrôle , chaotic Systems ,full synchronisation

Types of Presentation for a Conference (You can select one of these): Poster:...
status PHD Student...

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ON A GENERALIZED NON-STATIONARY STOKES PROBLEM UNDER TRESCA'S FRICTION BOUNDARY CONDITION

HANENE DEBBICHE, MAHDI BOUKROUCHE, AND LAETITIA PAOLI

Abstract. Motivated by applications to industrial processes like lubrication or extrusion/ injection. We consider non-stationary flow problems for general incompressible dilatant (shear thickening) fluids in a bounded domain $\Omega \subset \mathbb{R}^3$. The problem is described by a p-Laplacian Stokes system with $p > 2$ and we assume that the fluid is subjected to mixed boundary conditions, namely non-homogeneous Dirichlet boundary conditions on a part of the boundary and Tresca's friction law on the other part. From the latter condition, we obtain that the fluid velocity and pressure satisfy a non-linear parabolic variational inequality and belong to Banach spaces depending on p.
We prove the existence of a solution by using a fixed point technique combined with compactness and monotonicity arguments.
Then, we conclude by applying De Rham's theorem to construct the pressure term.

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PHD Student.....

Key words and phrases. Non-stationary shear thickening fluid flow, p-Laplacian, Tresca's friction law, Non-linear variational parabolic inequality, Monotonicity methods.

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MORDELL-TORNHEIM MULTIPLE ZETA VALUES AT NON-POSITIVE INTEGERS

ABDELKADER BOUDELLAL AND BOUALEM SADAOUI

Abstract. In this paper, we calculate the values of multiple Mordell-Tornheim zeta function at non-positive integers by means of *Raabe*'s formula and the *Bernoulli* numbers.

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PHD Student Yes

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Key words and phrases. Multiple Mordell-Tornheim zeta function, Special values, Raabe's formula, Analytic continuation, Integral representation, Bernoulli numbers and symbols.

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EXPONENTIAL STABILITY OF NONAUTONOMOUS ABSTRACT SEMILINEAR EVOLUTION EQUATIONS WITH A TIME-VARYING DELAY FEEDBACK

HOURIA CHELLAOUA AND YAMNA BOUKHATEM

Abstract. Let consider the following class of nonautonomous abstract delayed evolution equations with a nonlinear source term

$$(P)\quad \begin{cases} U_t(t) = A(t)U(t) + \alpha(t)BU(t-\tau(t)) + F(U(t)), & t \in (0,+\infty), \\ BU(t) = f(t) & t \in [-\tau(0),0], \\ U(0) = U_0, \end{cases}$$

where $A(t)$ be the infinitesimal generator of C_0 semigroup $\{S_t(s)\}_{s\geq 0}$ on H and $B : H \longrightarrow H$ is a continuous linear operator. $\alpha : \mathbb{R}_+ \longrightarrow \mathbb{R}$ is a function from the space $W^{1,\infty}([0,T];\mathbb{R})$, for all $T > 0$. $\tau : \mathbb{R}_+ \to (0,+\infty)$ belonging to $W^{2,\infty}([0,T])$, for all $T > 0$, represents the function of time delay and the initial datum (U_0, f) belongs to H and $C([-\tau(0),0];H)$, respectively. The nonlinear function F defined from H into itself satisfies some Lipschitz continuity assumption.

By assuming that the operator associated with the non delayed part of the system generates an exponentially stable semigroup and by using classical results in the theory of inhomogeneous evolution problem, we prove the well-posedness result of system (P). In addition, we obtain the exponential decay estimate by a direct proof based on the Duhamel's formula combined with Gronwall's inequality under some Lipschitz continuity conditions on the nonlinear source term.

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Key words and phrases. Nonautonomous delayed equation, Semigroup, Evolution family, Exponential stability, Lipschitz continuity.

Status: Research professor.

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RETROACTIVE EXAMINATION UNDER VARYING LOSS FUNCTIONS FOR TYPE II CENSORED DATA

KEDDALI MERIEM AND TALHI HAMIDA

Abstract. Using type II censored data, we conduct a Bayesian study of the upper truncated Zeghdoudi distribution. The posterior risks and Bayes estimators are obtained by utilizing several loss functions such as the entropy, Linex, and generalized quadratic functions. Since these estimators are not yet accessible in tractable analytical form, we suggest a simulation approach based on Markov chain Monte-Carlo (MCMC) to examine their performance. Furthermore, given the model's initial parameter values, we derive maximum likelihood estimators. Furthermore, we use Pitman's closeness criterion and integrated mean square error to evaluate their performance with the Bayesian estimators. Finally, we use an example using actual data to demonstrate our methodology.

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status
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Key words and phrases. Weibull model, exponential model, right censored sample, Bayesian estimations, expectation maximization algorithm, Markov chain Monte Carlo.

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HOW TO SOLVE A CONFORMABLE PARTIAL DIFFERENTIAL EQUATIONS BY ATOMIC SOLUTION?

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Keywords: conformable derivative, tensor product, atomic solution
2020 Mathematics Subject Classification: 26A33, 34A55.

Abstract
Sometimes, it is not possible to find a general solution for some differential equations using some classical methods, like separation of variables. In such a case, one can try to use theory of tensor product of Banach spaces to find certain solutions, called atomic solutions. The goal is to find atomic solution of fractional partial differential equation.

Types of Presentation for a Conference:
Oral communication

status
Research professor

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EXISTENCE OF SOLUTION FOR STOCHASTIC NONLOCAL RANDOM FUNCTIONAL INTEGRAL INCLUSION

FERRAG AZOUZ, BOUZENOUNT ABIR, AND AFIFI HOUDA

Abstract. In this article, we use Banachs fixed point theorem to estabilish sufficient conditions witch garantee the existence of the solution for a functional non local stochastic differential inclusions.

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Types of Presentation for a Conference : Poster

status: Research teacher

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Key words and phrases. stochastic, Banachs fixed point theorem, existence, stochastic integral inclusion.

THE NEW MIXTURE DISTRIBUTION: PROPERTIES & APPLICATION

CHOUIA SARRA AND ZEGHDOUDI HALIM

Abstract. This paper proposes a new distribution called XLindley distribution (XL); this distribution is generated as a special mixture of two known distributions : exponentiel and lindley and hence the name proposed. Also statistical properties like method of moment, stochatics ordering, The quantile function of XL distribution. We proceed to a simulation using The software R to obtain the parameter estimate of XL. Finally an application of the model to a real data set presented and compared with the fit and shows that XL distribution has more flexibility than others one-parameter distributions

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Key words and phrases. Lindley distribution, Exponentiel distribution, The method of moments, Method of maximum likelihood estimation, Lambert W function, Simulation .

On the uniqueness of the inverse problem for the Schrödinger equation with Dirichlet boundary condition

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abstract

This paper concerns the inverse problem of the recovery of unknown potential coeffcient for the Schrödinger equation in a bounded domain of $\mathbb{R}^n$ with Dirichlet boundary conditions from a Neumann boundary measurement. We prove uniqueness for this inverse problem under certain convexity hypothesis on the geometry of the interior domain and under weak regularity requirements on the data. Our proof relies sharp Carleman estimates in [5] for Schrödinger equations .

Keywords: Inverse problems, Uniqueness, Schrödinger equation, Carleman estimates.

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ON THE EXPONENTIAL DECAY OF A THERMOELASTIC POROUS SYSTEM WITH A FORCING TERM AND CONSTANT DELAY

MOHAMED HOUASNI AND ALI KRELIFA

Abstract. In this paper, we consider a one-dimensional porous-elastic system with a forcing and delay terms acting on the porous equations. Under suitable assumptions on the forcing function, we prove that the system is well-posed by using the semigroups method, and show, depending on the parameters of the system, that the dissipation induced by the heat is strong enough to obtain an exponential stability in the presence of a "small" delay.

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Key words and phrases. : Porous-elastic system,Lyapunov method, Delay, Exponential stability.

ON THE NUMBER OF LIMIT CYCLES OF A PLANAR DIFFERENTIAL SYSTEM

ABDALLAH BRIK AND AMEL BOULFOUL

Abstract. In this paper, we study the limit cycles of a perturbed differential system in $\mathbb{R}^2$, given by

$$\begin{cases} \dot{x} &= y, \\ \dot{y} &= -x - \epsilon(1+\sin^n(\theta)\cos^m(\theta))H(x,y), \end{cases}$$

where ϵ is a small parameter, m and n are non-negative integers, $\tan(\theta) = y/x$, and $H(x,y)$ is a real polynomial of degree $l \geq 1$. Using Averaging theory of first order we provide an upper bound for the maximum number of limit cycles. Also, we provide some examples to confirm and illustrate our results.

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Types of Presentation for a Conference (You can select one of these):
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Research professor: /
PHD Student: **Yes**

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Key words and phrases. Limit cycles, Averaging theory, Polynomial differential systems.

Fast and accurate A two dimensional numerical modeling of MOS transistor using finite difference time-domain

Samir Labiod, Ismail Tabet

Abstract

In this work, we present a numerical modeling for a MOS (Metal Oxide Semiconductor) transistor. It will be essential, however, for the reader to have a clear understanding of the MATLAB computer language in which all program will be written. We propose an efficient and accurate solver for the Drift-Diffusion model based on the well-known Gummel's decoupled algorithm to handle iteratively of the full equations system, while the discretization employs cell-centred finite difference method. In the case where the electrons and holes are depend with time, the discretization in time discrete of drift-diffusion model is used by Euler-implicit scheme, this latter permit to calculate the unknown variable v, n and p at each time step. Numerical results relative to the study of two-dimensional device are included to validate the effectiveness of the method, it found that the electrons are attracted in oxide-semiconductor interface while the holes, are repelled away, it found also the effect of electrons displacement around the drain junction caused for a higher drain voltage, and the depletion zone which appear in drain-bulk interface. The total charge of electrons and holes in channel are presented in time dependent, it leads to show several physics phenomenal where the electrons attraction and the displacement of holes to the bulk, also it confirms that after a transient regime, the drain current is stabilized a value corresponding to the steady in state regime.

Keywords: MOS transistor, Finite difference, Drift-Diffusion model, Gummel's method, Euler implicit scheme

A Density Functional Theory Study (DFT) of Electronic Properties of X_3V (X = Ir, Rh) Intermetallic Compounds

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Abstract

Electronic properties of X_3V (X = Ir, Rh) intermetallic compounds have been investigated based on density functional theory (DFT) method implemented in Wien2K program. Electronic density of states (DOS) and electronic band structure were computed and ploted. The density functional theory (DFT) provides the most widely used models for simulating molecules and materials based on the fundamental laws of quantum mechanics. It plays a central role in a huge spectrum of applications in chemistry, physics, and materials science. Quantum mechanics describes a system of N interacting particles in the physical 3 dimensional space by a partial differential equation in 3N spatial variables. The standard numerical methods thus incur an exponential increase of computational effort with N, a phenomenon known as the curse of dimensionality; in practice these methods already fail beyond N=2. DFT overcomes this problem by

1) reformulating the N-body problem involving functions of 3N variables in terms of the density, a function of 3 variables,

2) approximating it by a pioneering hybrid approach which keeps important ab initio contributions and re models the remainder in a data-driven way.

DFT calculations consume a significant fraction of the world's supercomputing power and tens of thousands of scientific papers report DFT calculations with the number ever growing. Kohn–Sham density functional theory (KS DFT) is in principle exact, but in practice, it requires approximations to one piece of the total energy, the so-called exchange–correlation (XC) functional, whichencodes the quantum, fermionic, and Coulombic nature of electrons. Despite the progress, state of the art XC approximations have been greatly successful mainly in describing onlyweak and moderate electronic correlations. The inability of state of the art DFT to capture strong correlations hampers its reliability and predictive power. Over the last two decades, the strongly interacting limit of DFT (SIL) has been explored and a rigorous theory has been established. This theory reveals mathematical objects that are very different from the ingredients that are used for building standard XC approximations (semilocal quantities and KS orbitals forming the Jacob's ladder). By offering building blocks for XC functionals tailored to describe strong correla-tions, the SIL has a potential to solve the long-standing problem of DFT simulations of strong electronic correlations.

Using the Levy–Lieb (LL) constrained-search formalism the ground state energy and density of a many-electron sys-tem in an external potential v: $\mathbb{R}^d \rightarrow \mathbb{R}$can be obtained as

$$E_{GS}[v] = \min_{\rho} \left\{ F[\rho] + \int v(\mathbf{r})\rho(\mathbf{r})d\mathbf{r} \right\}, \quad (1)$$

Where ρ (r) is the one-electron density, and where F[ρ] is the λ=1 (physical) value of the generalized universal LL functional for arbitrary coupling constant λ,

$$F^{\lambda}[\rho] = \min_{\Psi \mapsto \rho} \langle \Psi | \hat{T} + \lambda \hat{V}_{ee} | \Psi \rangle, \quad (2)$$

With T the kinetic energy operator and V_{ee} the electron–electron (Coulomb) repulsion operator. The physical dimension d is 3.

Theoritical study of Pd3V and Pt3V intrmetallics based on Density Functional Theory (DFT) method

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Abstrat : In this work, structural properties of Pd_3V and Pt3V are computed within ab initio calculation based on Density Functional Theory (DFT). Employing the full potential linearized augmented plane wave (FP-LAPW) method implemented in the WIEN2k code [1-3]. Exchange correlation functional was treated within the Generalized Gradient Approximation (GGA) with the Perdew-Burke_Emzerhof (PBE) and the local density approximation (LDA).

The Vanadium based L12 intermetallic compounds such as Pd_3V, Pt_3V, are found to crystallize in Cu3Au type structure similar to Rhodium based compounds with the space group symmetry Pm_3m (221) Pd, Pt atoms are positioned at (0, 0, 0) position. The V atom is positioned at (0, 0.5, 0.5)

Table 1. Calculated equilibrium lattice constant (*a*0, in Å), total, bulk modulus (B0, in GPa), pressure derivative of the bulk modulus (B'), for the Pd3V Pt3V, alloys in the L12 structure

Compound		Parameters (a_0 A°)	B (GPa)	B`
Pd3V	Present GGA	3.882	165.813	4.115
	Present LDA	3.800	260.719	5.620
	Other	3.889	186.72	4.85
Pt3V	Present GGA	3.913	297.688	-0.278
	Present LDA	3.844	304.840	4.560
	Other	3.936	239.02	5.17

As the first step, the equilibrium lattice constant was determined by minimizing the total energy with respect to different values of the lattice constant. Then, the total energy volume data are fitted to the Murnaghan equation of state [29] to obtain the equilibrium lattice constant *a*0, bulk modulus *B*0 and first-order pressure derivative of the bulk modulus *B*′. The obtained values of *a*0, *B*0 and *B*′ for the Pd3V and Pt3V compounds are tabulated in Table 1 along with the existing . The theoretical results achieved in this work very close to other theoretical results[1-4].

Keywords: DFT, intermetallics, Pd3V, Pt3V.

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Statistical Modeling of LC-MS/MS Phytochemical Analysis of Ruta montana and Its Hepatoprotective Effects in Male Rats Exposed to Tebuconazole

Badis Aouzal, Souheila Slimani, Fatima Kamah, Ismahane Ounissi, Aninssa Bouacha and Elmokli Samira

Abstract:
In this study, we applied statistical modeling and quantitative analysis to evaluate the hepatoprotective pot ential of *Ruta montana* in counteracting liver toxicity induced by the systemic fungicide tebuconazole in ma le Wistar rats. A total of 42 specimens (mean weight:
178±67.2 g) were randomly assigned to six experimental groups (n=7 per group) following a controlled, str atified randomization protocol.

To assess the impact of treatments, we employed inferential statistical techniques, including ANOVA for in tergroup comparisons and post-
hoc Tukey tests to determine significant pairwise differences. The first group served as a control, while the second received tebuconazole (100 mg/kg). The third and fourth groups were administered *Ruta montana* extracts (50 mg/kg and 100 mg/kg, respectively). The last two groups were co-
treated with tebuconazole (100 mg/kg) and *Ruta montana* at respective doses of 50 mg/kg and 100 mg/kg . Treatments were administered via oral gavage over 50 days, ensuring a consistent dosage protocol.

LC-
MS/MS analysis of the ethanolic extract, obtained via maceration, identified nine dominant phenolic comp ounds. From a statistical perspective, tebuconazole exposure resulted in a significant decrease in both bo dy and liver weights ($p <$
0.05), as well as a marked elevation in hepatic enzyme markers (AST, ALT), indicative of hepatotoxicity. T he application of *Ruta montana* extracts significantly mitigated these adverse effects, with dose-
dependent improvements confirmed via effect size calculations and confidence interval estimations. Furth ermore, histopathological evaluations were subjected to image-
based quantitative analysis, reinforcing the protective role of *Ruta montana* in liver tissue recovery.

This study illustrates the crucial role of statistical methodologies in validating pharmacological intervention s and underscores the therapeutic potential of *Ruta montana* in hepatic protection.

Keywords:
Ruta montana, LC-MS, Tebuconazole, Statistical modeling, Wistar rat, Hepatotoxicity.

A NUMERICAL METHOD BASED ON FINITE DIFFERENCE FOR WAVE SYSTEM WITH VARIABLE COEFFICIENT

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ABSTRACT

We study a weve system type model with variable coefficient. We consider a semi-discretization with respect to time. We have a sequence of stationary problems. Reformulating the problem into a variational problem and thanks to the appropriate assumptions, we establish a result of existence and uniqueness of the solution of the stationary problem. The same problem allowing the analysis of the behavior of the iterative relaxation algorithm used for the numerical solution of the discretized problem (finite difference). Finally, numerical simulations are displayed.

Keywords : Approximation, variational problem, dicretization by finite difference, iterative relaxation algorithm.

Types of Presentation for a Conference (You can select one of these):
Oral communication ×
Poster:.....

status
Research professor ×
PHD Student.....

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