



People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research
Ecole Normale Supérieure El Katiba Assia Djebar Constantine
Applied Mathematics and Didactics Laboratory



CERTIFICATE

This is to certify that:

Bilal BASTI

has participated with an oral presentation entitled:

Application of Fractional Calculus in The Modeling of Biological Phenomena and Infectious Diseases

In the Second National Conference on Applied Mathematics and Didactics 2NCAMD2023,

held online on May 13, 2023.

Chairman of 2NCAMD2023
Dr. ABADA Nadjat

Nadjat Abada
Alay

Director of the Laboratory
Prof. BELLOUR Azzeddine





Opening Ceremony (08:15-08:30)

Prof. Azzeddine Bellour (Director of Laboratory MAD)

Plenary Session

Chair: Dr. Nadjat Abada

Keynote Speaker 1 (08:30-09:00)

Prof. Hisao Fujita Yashima -ENS Constantine

Title of the presentation:

Modélisation mathématique de l'atmosphère.

Keynote Speaker 2 (09:10-09:40)

Prof. Djamel Ouchenane- University Amar Telidji Laghouat

Title of the presentation:

**Global Well-Posedness and Exponential Stability results for
Bresse-Timoshenko type system of second sound with
Distributed delay term.**

Google Meet Link: meet.google.com/nch-jafj-wew



SCAN ME



Second National Conference on Applied Mathematics and Didactics 2NCAMD2023, Constantine-Algeria. May 13, 2023.



SCAN ME

Session A: Differential Equations

Chair: **Nadjet ABADA**

Google Meet Link: meet.google.com/gqy-pyrq-npm

Hours	Oral Presentation Speakers	Presentation Titles	EMails
10:00 10:10	Marwa KHEMIS	Positive periodic solutions for a delayed model of hematopoiesis by Schauder's fixed point theorem	khemismarwa08@gmail.com
10:15 10:25	Chaima BOULKHELOUA	Well-posedness and stability result of Bresse system with internal distributed delay term	boulkchaima33@gmail.com
10:30 10:40	Chaima SAADI	Existence, uniqueness of weak solution for non-linear fractional system involving a fractional gradient	saadichaima248@gmail.com
10:45 10:55	Lina CHETIOUI	Analytical solution for the Caputo time-fractional Newell-Whitehead-Segel equation	lina.chetoui@univ-setif.dz
11:00 11:10	Hacen SERRAI	A Study of psi-Caputo Fractional Boundary Value Problem Describing a Special Cases of Sturm-Liouville Model	hacenserrai31@gmail.com
11:15 11:25	Nesrine KAMOUCHE	Développement asymptotique des intégrales doubles du type de Laplace dans le cas d'un point minimum	kamouche_nesrine@hotmail.fr
11:30 11:40	Helal MOHAMED	On Fractional Differential Perturbed Equations with Infinite State-Dependent Delay in Banach Spaces	helalmohamed@univ-mascara.dz
11:45 11:55	Aida IRGUEDI	Existence and uniqueness results for impulsive fractional differential equations with nonlocal conditions	mathirguedi@gmail.com
12:00 12:10	Abdellatif GHENDIR AOUN	On positive solutions for fractional differential equation with boundary conditions on infinite domain	ghendirmaths@gmail.com
12:15 12:25	Choukri DERBAZI	Some application of Perov's fixed point theorem to a coupled system of integral equations	choukri.derbazi@umc.edu.dz
12:30 12:40	Safa CHOUAF	solving two-point boundary value problem via Schauder fixed point theorem	safachouaf905@gmail.com
12:45 12:55	Abdellouahab NAIMI	Existence proof of the solution for a nonlinear Caputo fractional differential equation with Initial conditions on unbounded domain.	naimimath@gmail.com
13:00 13:10	Guendouz CHEIKH	Monotone Positive solutions of a nonlinear fourth-order integral Multi-point Boundary boundary value problem	guendouzmath@yahoo.fr
13:15 13:25	Hafsa GORINE	Caputo-Hadamard fractional differential equations with four-point boundary conditions	hafsagorine@gmail.com
13:30 13:40	Lydia BOUCHAL	On existence of solutions for a singular fourth order boundary value problem with parameter	lydia.bouchal@univ-bejaia.dz
13:45 13:55	Salah BENHIOUNA	The existence of a periodic solution for second order nonlinear delay differential equations	benhiounasalah@gmail.com
14:00 14:10	Adel LACHOURI	Existence and uniqueness results for a class of fractional differential equations with mixed nonlocal conditions	lachouri.adel@yahoo.fr
14:15 14:25	Halima KADARI	Existence of positive solutions of impulsive nonlinear differential systems of second order with two point boundary condition	kadari23halima@gmail.com



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Session B: Differential Equations

Chairs: Yacine HALIM and Abdeldjalil AOUANE

Google Meet Link: meet.google.com/skx-yfgz-sbr

Hours	Oral Presentation Speakers	Presentation Titles	EMails
10:00 10:10	Abdelkrim SALIM	A Study on Some (k, ψ) -Hilfer Generalized Boundary Value Problems with Retarded and Advanced Arguments	salim.abdelkrim@yahoo.com
10:15 10:25	Amira REMADNA	Scalar linear delay systems with two delays	amira23remadna@gmail.com
10:30 10:40	Lamine GUEDDA	Existence Result for Nonlocal Boundary Value Problem of Fractional Order at Resonance with p -Laplacian Operator	lguedda_ig@ymail.com
10:45 10:55	Ichrak BOUACIDA	Existence results of Mild solution for Sobolev type (ψ, η) -Hilfer hybrid fractional differential evolution equations.	ichrakbouacida@gmail.com
11:00 11:10	Farid CHABANE	Solution of p -Laplacian boundary value problems with some existence results.	chabaneFarid201644@gmail.com
11:15 11:25	Nourredine HOUARI	A note on a class of fifth-order boundary value problems	noureddinehouari.mi@gmail.com
11:30 11:40	Abdelbadie YOUNES	On a fractional Hamilton-Jacobi equation: stationary case	abdelbadieyounes@gmail.com
11:45 11:55	Zidane BAITICHE	Extremal Solutions for Generalized Caputo-Type Fractional-Order Boundary Value Problem	baitichezidane19@gmail.com
12:00 12:10	Mohammed Amine BENMELOUKA	Existence and uniqueness of abstract differential equations in Holder space	benmloukamohamedamine31@gmail.com
12:15 12:25	Ahlem BENZAH	Measure of noncompactness and the Cauchy problem of Caputo-Fabrizio fractional differential equations with not instantaneous impulses.	a.benzahi@centre-univ-mila.dz
12:30 12:40	Abdelhamid GOUASMIA	Existence and global behavior of weak solutions to a doubly nonlinear evolution fractional p -Laplacian equation	gouasmia.abdelhamid@gmail.com
12:45 12:55	Khellaf Ould MELHA	Robin Abstract Problem for the Second Order Differential Equation in Holder Space.	k.ouldmelha@univ-chlef.dz
13:00 13:10	Boumaaza MOKHTAR	Random solutions for mixed fractional differential equations with retarded and advanced arguments	boumaaza.mokhtar@yahoo.com
13:15 13:25	Mohammed TEWFIK GHOMARI	Existence results for a Hardy-Sobolev equation on compact Riemannian manifolds	tewfikfr6@gmail.com
13:30 13:40	Soumaya CHERAIET	Positive solutions of an iterative three-point boundary-value problem	soumayacheraiet@gmail.com
13:45 13:55	Issam ABDENNEBI	Sinc-Galerkin Method for Solving Second-order Linear Ordinary Differential Equations on the Half-line	issam.abdennebi@univ-bba.dz



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Session C: Differential Equations

Chair: HISAO FUJITA YASHIMA

Google Meet Link: meet.google.com/jpy-tekk-xxp

Hours	Oral Presentation Speakers	Presentation Titles	EMails
10:00 10:10	Fares YAZID	A stability result of a Timoshenko system in thermoelasticity of second sound with a delay term	f.yazid@lagh-univ.dz
10:15 10:25	Ala Eddine DRAIFIA	Blow-Up for a Viscoelastic Plate Equation with Balakrishnan-Taylor Damping and Logarithmic Nonlinearity Source	draifia1991@gmail.com
10:30 10:40	Meriem CHABEKH	Stability Results for a Thermoelastic Laminated Timoshenko Beam with Distributed Delay Term	meriem.chabekh96@gmail.com
10:45 10:55	Abdelaziz AZEB AHMED	A frictional contact problem in thermo-electro-viscoelasticity	aziz-azebahmed@univ-eloued.dz
11:00 11:10	Narimene BENARBIA	Modélisation de la transmission sylvatique de la maladie de Chagas par les équations différentielles à coefficients opérateurs.	narimene.benarbia@univ-tlemcen.dz
11:15 11:25	Abdelaziz LIMAM	General decay for a variable coefficients thermo-viscoelastic coupled system of second sound with acoustic boundary conditions	limaziz994@gmail.com
11:30 11:40	Hocine MAKHELOUFI	General stability estimate for global solutions of a second-order differential equation with a viscoelastic damping and weak delay term	hocine_makheloufi@yahoo.com
11:45 11:55	Hanene MEGHELLI	Global stability of an SIS and SEIR differential-difference system with age-structured protection	mhanene97@gmail.com
12:00 12:10	Khezzani RIMI	Mathematical analysis of fractional visco-elastic contact problem involving friction and thermal effect	rimikhazzani39@gmail.com
12:15 12:25	Asma BEN MOUSSA	Study Well-posedness and Exponential Stability of a Thermoelastic Shear Beam Model	benmoussa-asma@univ-eloued.dz
12:30 12:40	Mohammed MEZIANE	La date du pic épidémique dans un modèle de SEIR	mezianemed0@gmail.com
12:45 12:55	Widad KAREK	On the stabilization of Lord Shulman thermoelastic system with porous damping and delay term	karekwidad21@gmail.com
13:00 13:10	Wissem BOUGHAMSA	Local well-posedness of solution for a higher-order wave equation with viscoelastic term and variable-exponent	wissem.boughamsa@univ-skikda.dz
13:15 13:25	Karima ABDELMALEK	Global classical solutions for reaction-diffusion system with a tridiagonal symmetric Toeplitz matrix of diffusion coefficients	abdelmalekmath@gmail.com
13:30 13:40	Ahlem CHETTOUH	Étude numérique d'un cas particulier du modèle de proie-prédateur.	ahlemch70@gmail.com
13:45 13:55	Samiha DJEMAI	Degenerate Reaction-Diffusion Model Arising From Ecology	samihadjemai21@gmail.com
14:00 14:10	Fatima Zohra HATHOUT	The effect of immigration on the spread of an infectious disease in an age-structured population.	fatima.zohra.hathout@gmail.com



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Session D: Differential Equations

Chair: Lamia BENSABIH

Google Meet Link: meet.google.com/ozp-ayhe-vwz

Hours	Oral Presentation Speakers	Presentation Titles	EMails
10:00 10:10	Abdelkrim ZEKRI	On the parabolic equation with nonlocal conditions	zekri6080@gmail.com
10:15 10:25	Imane BOULMERKA	On the stability of solution of a nonlinear damped wave equation	i.boulmerka@univ-batna2.dz
10:30 10:40	Aounallah RADHOUANE	Wave energy decay under fractional derivative controls	radhouaneaounallah@gmail.com
10:45 10:55	Allaoui Nour ELHOUDA	Anisotropic Elliptic Equations With Variable Exponents and Degenerate Coercivity with L^m data	nourallaoui95@gmail.com
11:00 11:10	Imane BOULMERKA	On the stability of solution of a nonlinear damped wave equation	imaneboulmerka@gmail.com
11:15 11:25	Mohammed RABAH	Abstract Sturm-Liouville problems for an equation simple second-order elliptic abstract differential in a Hölder space	mrabah1980@gmail.com
11:30 11:40	Nabila BARROUK	Invariant regions and Asymptotic behavior for nonlinear parabolic systems with a tridiagonal symmetric Toeplitz matrix	n.barrouk@univ-soukahrass.dz
11:45 11:55	Zakia TEBBA	A New Class of Quasilinear Wave Equation with Nonlinearity Variable Exponents: Blow-Up Result	tebbazakia93@gmail.com
12:00 12:10	Hanane BENKHEDDA	A general decay result of a wave equation with a dynamic boundary control of diffusive type	benkhedda-hanane@outlook.fr
12:15 12:25	Sami LOUCIF	Asymptotic stability result of some evolution problem	conferences2022conferences@gmail.com
12:30 12:40	Chafia KAREK	Asymptotic behavior of quasilinear elliptic problems with L^1 data	karekchafia@gmail.com
12:45 12:55	Chaima BOUSBIAT	Spectral analysis of the instationary incompressible Stokes equations	bousbiatc2@gmail.com
13:00 13:10	Zainouba CHEBANA	Blow up of generalized parabolic problem	chebanazainouba@yahoo.com
13:15 13:25	Chahinez BELLAMOUCI	RADIAL POSITIVE SOLUTIONS FOR SOME NONLOCAL ELLIPTIC EIGENVALUE PROBLEM	cchahinez80@gmail.com bellamouchi-chahinez@univ-eloued.dz
13:30 13:40	Siham BOUKARABILA	Singular elliptic problem with superquadratic growth in the gradient	siham_95@outlook.fr
13:45 13:55	Imane ABIBSSI	On Second Order Perturbed Evolution Equations With State-Dependent Delay	abibssi.imene@gmail.com
14:00 14:10	Abir CHAOUICHE	Modelisation of maxwell equations	abirischauouche@gmail.com
14:15 14:25	Fatma ACHAB	Optimal control of an hyperbolique equation with incomplete data	achabfatma2019@gmail.com
14:30 14:40	Abir BOUNAAMA	Existence and decay results for a weighted quasilinear hyperbolic problem with source terms.	a.bounaama@univ-skikda.dz



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Session E: Differential Equations

Chairs: **Azzeddine BELLOUR** and **El Mehdi ZAOUCHE**

Google Meet Link: meet.google.com/nch-jafj-wew

Hours	Oral Presentation Speakers	Presentation Titles	E Mails
10:00 10:10	Hassan MESSAOUDI	The nonlinear Moore-Gibson-Thompson problem: Existence, uniqueness, and general stability	hassanmesssaoudi50conf@gmail.com
10:15 10:25	Lakehal IBRAHIM	Well posedness and decay of the full Von Kármán beam by thermal effect and delay	ibrahimlak1991@gmail.com
10:30 10:40	Rabah DJEMIAT	Effective results concerning new functional solutions of fractional hyperbolic problems with an inverse source term	rabahdjemiati19@gmail.com
10:45 10:55	El-Hadi KAMEL	Existence of solutions for a plate equation with a dispersion term	aehadikamel@gmail.com
11:00 11:10	Said MAZOUZ	Growth of solutions to linear differential equations with analytic coefficients a punctured disk	said.mazouz.etu@univ-mosta.dz
11:15 11:25	Rabah HAOUA	Fractional power approach for the study of elliptic second order boundary value problems with variable operators coefficients in UMD spaces	rabah.haoua@univ-mosta.dz
11:30 11:40	Somia ATMANI	Fractional regularity to the fractional heat Equation and application to KPZ fractional problem	somiaatmani@gmail.com
11:45 11:55	Kamel BENYETTOU	A Novel Approach to Solving Conformable Fractional 2D State Space Continuous-Time Linear Systems	kamel.benyattou.etu@univ-mosta.dz
12:00 12:10	Nadjiba ABDI	Existence of solution for an evolution problem with maximal monotone operators	nadjibaabdi.1@gmail.com
12:15 12:25	Dounya KECHICHE	Stabilization of the thermoelastic Kirchhoff plate equations with delay term and boundary control	kechichdounia19@gmail.com
12:30 12:40	Amal BENGUESMIA	An Inverse Problem For a Time Fractional Parabolic Equation With An Integral Condition	benguesmia.amal@univ-oeb.dz
12:45 12:55	Samira LECHEHEB	Existence result for nonlinear elliptic system via topological degree methods	lecheheb.samira24@gmail.com
13:00 13:10	Amar CHIDOUH	Study of fractional Voigt model involving a creep function	chidouh-amar@univ-eltarf.dz
13:15 13:25	Naouel KECHICHE	Polynomial decay of the energy of système of timoshenko beam with memory term and dynamical conditions.	kechiche.naouel@ensc.dz
13:30 13:40	Djalal BOUCENNA	Analytical study for Darboux problem for proportional partial fractional differential equations	djalal.boucenna@enset-skikda.dz
13:45 13:55	Maroua NOUAR	On the inverse problem of identifying source terms in a system of coupled time-fractional diffusion equations	nouar.maroua@yahoo.com
14:00 14:10	Esma ABADA	Existence results of weak solutions to a nonlinear fractional partial differential system	esmaa.abada@gmail.com



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Session: Numerical Analysis

Chairs: Nouria ARAR and Hafida LAIB

GoogleMeet Link: meet.google.com/nrx-ybsx-btk

Hours	Oral Presentation Speakers	Presentation Titles	EMails
10:00 10:10	Ikram MANSOURI	Analytical and numerical study of a fractional coupled system with Caputo-Fabrizio fractional derivative	mansouri-ikram@univ-eloued.dz
10:15 10:25	Hanane CHINOUNE	Application of modified version of the Adomian decomposition method for some fractional differential equations.	chinonhanan@gmail.com
10:30 10:40	Abd Elhamid MEHAMDIA	une méthode modifiée de gradient conjugué pour résoudre une optimisation sans contrainte et une application	mehamdiaabdelhamid@gmail.com
10:45 10:55	Khaoula ROUIBAH	On the Resolution of Two-Dimensional Volterra Integral Equations by Iterative Collocation Method	r.khoula@centre-univ-mila.dz
11:00 11:10	Hanane LAKIKZA	Mathematical study of multiphase flow problem in a porous medium and applications	hananelakikza21@gmail.com
11:15 11:25	Cheima KHENNAOUI	Resolving Two-Dimensional Partial Volterra Integro-Differential Equations Using the Taylor Collocation Method	c.khennaoui@centre-univ-mila.dz
11:30 11:40	Nadir DJEDDI	Numerical Evaluation of Fractional Differential Equation with Integral Boundary Conditions via Reproducing Kernel Hilbert Method	nadir.djeddi@univ-tebessa.dz
11:45 11:55	Walid REMILI	Numerical solution of linear Volterra integral equations	walid.remili@univ-bba.dz
12:00 12:10	Kelthoum Lina REDOUANE	An effective Numerical technique for solving the Linear One-dimensional Telegraph Equation based on Cubic B-Spline Collocation.	kelthoumlina.redouane@student.umc.edu.dz
12:15 12:25	Zineb LAOUAR	A Numerical Approach for Solving Nonlinear Fractional Integro-Differential Equations	z.laouar@centre-univ-mila.dz
12:30 12:40	Ilhem MOUS	Linearized method for class of the nonlinear convection-diffusion equation	mousilhem@yahoo.fr
12:45 12:55	Sassia ZAIDI	Quality evaluation of interpolation techniques for digital holographic image magnification	sassia.optique@gmail.com
13:00 13:10	Somia BOUMIMEZ	Approximation of exact controllability for the waves equation	somia.boumomez@alumnos.upm.es
13:15 13:25	Youcef HENKA	Laguerre Polynomials-Collocation Scheme for Solving Integro-Differential Equations with Caputo Fabrizio Derivative	henka.youcef.henka@gmail.com
13:30 13:40	Nesrine GOURI	Bearing Diagnosis using Fault Signal Enhancing Technique	gou.nesrine@gmail.com
13:45 13:55	Hafida LAIB	An algorithm for solving linear double delay Volterra integral equations by using a collocation method	hafida.laib@gmail.com



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SCAN ME

Session: Number Theory and Applications - Didactics of Mathematics

Chairs: Hamza MOUFEK and REZIG Boualem

GoogleMeet Link: meet.google.com/ykn-zcqt-ebh

Hours	Oral Presentation Speakers	Presentation Titles	E-Mails
10:00 10:10	MOKHTARI Soufyane	Inertia groups of ramified prime ideals of the splitting field of the trinomial $X^{p^2} + aX + a$	smoukhtari@usthb.dz
10:15 10:25	LABIOD Imane	Construction of a new class of Symmetric Function of Binary Products of Generalized Tribonacci numbers with Gaussian numbers.	labiodimane7@gmail.com
10:30 10:40	BENSELLA Hayat	Fermat numbers and Leonardo sequence	hbensella@usthb.dz
10:45 10:55	SELIKH Bilel	Implementation of new cryptographic system using a non-commutative ring	bilel.selikh@univ-msila.dz
11:00 11:10	AMROUNE Zahra	A detailed study of the solution of the equation: $d(n) = \phi(\phi(n))$	zahra.amroune@univ-msila.dz
11:15 11:25	AMEUR Zahra	On the exponential Diophantine equation $(a^n - 1)(b^n - 1) = x^2$	ameur.zahraa@gmail.com
11:30 11:40	SEFFAH Safia	On Fermat and Mersenne numbers expressible as product of two k-Fibonacci numbers	safiaseffah58@gmail.com
11:45 11:55	MOHAMMED SAID Ferhat	Difficulties Faced by Students of the First Year in Learning Mathematics at El-Oued University	ferhat-mohammedsaid@univ-eloued.dz
12:00 12:10	GHADRI Amel	Generating functions of generalized Fibonacci polynomials and k-Mersenne Lucas	ghadriamel3@yahoo.com
12:15 12:25	REZIG Boualem	Positivity of Hankel and Toeplitz determinants of Hyperlucas numbers	boualem.rezig@gmail.com



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Session A: Functional Analysis

Chairs: Leila AITKAKI and Amina Nemdili

GoogleMeet Link: meet.google.com/fee-vhrt-dgi



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Hours	Oral Presentation Speakers	Presentation Titles	E-Mails
10:00 10:10	LAKEHAL Rachid	Some results for weakly strongly star Menger (wSSM)	rachid.lakehal93@gmail.com
10:15 10:25	BEGHERSA Nor-El-Houda	A spectral method for studying a pencil of bounded operators	beghersanourelhouda1@gmail.com
10:30 10:40	KASRI Hichem	Uniform stabilization for wave equations with damping only on the linear Wentzell boundary conditions	h.kasri@hotmail.com
10:45 10:55	DJERIBIA Oussama	A Contribution to the Theory of Positive Summability	o.djeribia.math@lagh-univ.dz
11:00 11:10	ZEGHAD Zouheyr	Boundedness of vector-valued operators on variable Herz spaces	zgzoheyr@gmail.com
11:15 11:25	BATAHRI Asma Amira	Existence and Asymptotic Behavior for a Nonlinear elliptic problem involving the Fractional p-Laplacian	batahriamira@gmail.com
11:30 11:40	SMAIL Sara	Essential approximation pseudospectrum and essential defect pseudospectrum	s.smail.math@lagh-univ.dz
11:45 11:55	DEHIMI Souheyb	Unbounded versions of the Fuglede-Putnam theorem	sohayb20091@gmail.com
12:00 12:10	BENSAID M'Hamed	Iterate problem for operators with polynomial coefficients in Roumieu Gelfand-Shilov spaces	bensaidx@gmail.com
12:15 12:25	TIAIBA Toufik	The Lipschitz L_p -factorable operators and some Property	toufik.tiaiba@univ-msila.dz
12:30 12:40	ZID Sohir	Some properties of the operator transform $S_r(T)$	s.zid@univ-batna2.dz
12:45 12:55	FERRADI Athmane	Remark on p-Dunford-Pettis property	ferradiathmane@gmail.com



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Session B: Functional Analysis

Chair: Badredine BOUDJEDAA

GoogleMeet Link: meet.google.com/kbj-xktp-zuv

Hours	Oral Presentation Speakers	Presentation Titles	E-Mails
10:00 10:10	ATTAB Sara	An existence theorem for a general iterative differential inclusion	sara.atab@gmail.com
10:15 10:25	IRGUEDI Aida	Existence results for impulsive fractional differential equations in Banach space	aidairguedi@gmail.com
10:30 10:40	MEBARKI Khadidja	Coupled Fixed Point Theorems for mixed G-monotone nonlinear operators in b-Metric Space Endowed with a Graph with Application	kha.mebarki@univ-adrar.edu.dz
10:45 10:55	GHALIA Samia	Iterative differential inclusion with convex perturbation	sghalia01@gmail.com
11:00 11:10	LAKHDAR Souidi	Existence and global-exponential stability of periodic solution of BAM neural networks with impulses and delays.	lakhdar.souidi@univ-mosta.dz
11:15 11:25	FENNOUR Fatima	Existence solutions for first-order differential inclusions with perturbations	fennourfatima38@gmail.com
11:30 11:40	MECEMMA Imene	First-order differential inclusion governed by the sweeping process	imene.mecemma@gmail.com
11:45 11:55	SAÏDI Soumia	On a differential inclusion type with applications	soumiasaidi44@gmail.com
12:00 12:10	LAOUADI Besma	Novel findings on fixed point theory in the b-metric space using rational contractive conditions	laouadi19951@gmail.com
12:15 12:25	BOULFOUL Bilal	A measure of weak noncompactness in $L^1(R^N)$ and applications	bilal_maths@hotmail.com



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SCAN ME

Session: Optimization

Chairs: Manel KOLLI

GoogleMeet Link: meet.google.com/vkf-ucbg-okz

Hours	Oral Presentation Speakers	Presentation Titles	E-Mails
10:00 10:10	BELKHIRI Radja	Properties of solution to a linear model	radja.belkhiri@univ-oeb.dz
10:15 10:25	NACER Meriem	A Hybrid Salp Swarm Algorithm with Chaos Theory	Souhilanacer24@gmail.com
10:30 10:40	MOUSAAB Bouafia	The short-step projective interior point method for linear optimization	mousaab84@yahoo.fr
10:45 10:55	ELHAMZA Billal	The penalization method for the optimal control of the diffusion equation	bilal.elhamza@univ-tebessa.dz
11:00 11:10	ABID CHAREF Okba	Optimization and Numerical Analysis of Dynamical Systems with Negative Stiffness using Equal-Peak theory	okba3c@gmail.com
11:15 11:25	BRAHIMI Abdelhalim	Optimization of Ternary Composites Dielectric Behavior Modeling Using Modified Lichtenecker Law	abdelhalim.brahimi@univ-setif.dz
11:30 11:40	GUERDOUH Safa	A primal-dual interior-point method for solving linear optimization problems based on a hyperbolic kernel function	guerdouhsafa@gmail.com
11:45 11:55	LEULMI Soumya	An interior point method for solving linear semi-definite optimization problem	leulsou@yahoo.fr
12:00 12:10	SBIA Manel	Contrôle Optimal d'un système de Lotka-Volterra à trois espèces	manel.sbia17@gmail.com
12:15 12:25	BOUSSAID Omar	On symmetric polyconvexity conditions of quadratic forms	omarb343@gmail.com
13:00 13:10	KHETTABI Imen	Sustainable Multi-objective in RMS: Evolutionary-based Approaches NSGA-II vs D-NSGA-II vs New Dynamic NSGA-II	imen.khettabi1@gmail.com
13:15 13:25	BENMENNI Rania	Feedback saddle point in linear quadratic zero-sum differential games	ranianina026@gmail.com
13:30 13:40	LOUAFI Meriem	Average no-regret and average low-regret controls of a thermoelastic Kirchhoff-Love plate problem	meriemplouafi01@gmail.com
13:45 13:55	ZEGHAD Bochra	Bregman Proximal Method for Variational Inequality Problems	bochrazeghad@gmail.com
14:00 14:10	DIDA Hedifa	Artificial bee colony optimization algorithm for CT image registration of lung infected with COVID-19	telecomdida@gmail.com



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SCAN ME

Session A : Probability and Statistics
Chairs: Soumia KHARFOUCHI and Sarra LEULMI
GoogleMeet Link: meet.google.com/ccu-pups-cap

Hours	OralPresentationSpeakers	PresentationTitles	E-Mails
10:00 10:10	BOUDADA Halima	Uniform Almost Sure Consistency of a Functional Generalized Regression Estimate for a Random Left-Truncation and Mixing Model	boudadah@yahoo.com
10:15 10:25	SOUDDI Youssef	the Non-parametric Estimation of The conditional EmpiricalProcess With Functional Ergodic Data	souddiyoucef@yahoo.fr
10:30 10:40	MEKKI Soundes	Analyse en composantes principales en utilisant Python	soundes.mekki@doc.umc.edu.dz
10:45 10:55	KOUADRIA Mohamed	Application of Least-Squares Dummy Variable (LSDV) Model in Charitable Giving	mehamadk@gmail.com
11:00 11:10	BOUAZZA Imane	Real-time estimation of conditional quantile in nonparametric high-dimensional statistics	imanebouazza94@gmail.com
11:15 11:25	LEULMI Farid	Relative errorregressionfunctionestimator for heterogenous data	farid_leulmi@yahoo.fr
11:30 11:40	MANSOURI Charef Eddine	Detecting multiple periodicities in observational data withthmultifrequencyperiodogram	charafmansouri23@gmail.com, charaf619@gmail.com
11:45 11:55	TOUMI samia	Nonparametric estimation of the copula function.	samia.toumi@univ-biskra.dz, tomi.samia15@gmail.com
12:00 12:10	HAYAT louhab	Asymptoticnormality of the kernel type expectileregession estimation for functional data withresponsesmissingatrandom	hayat.louhab@yahoo.fr
12:15 12:25	AHMEDI EZZOURGUI Zahia	Queueing system withworking vacation and linear impatient customers, interruption vacation and applications in network on chip	zahiaahmedi1992@gmail.com
12:30 12:40	RAMDANI Hayat	On multi-server queue with batch arrival, disasters, and customers'impatience	ramdanihayat30@gmail.com
12:45 12:55	ELHADJ hamel	Quadraticerrorsproperties of functionalregressionestimatorunderdependence.	ha2.hamel@gmail.com
13:00 13:10	AFROUN Faïrouz	Discretekernel estimation in the inventory model	afrounfairouz@gmail.com
13:15 13:25	LEULMI Sarra	Estimation non paramétrique de la densité conditionnelle pour des données fonctionnelles hétérogènes	math17sara@yahoo.fr



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SCAN ME

Session B: Probability and Statistics

Chairs: Lamia ABADA, Soheir BELALOU and Soumeya BENZEGHBA.

GoogleMeet Link: meet.google.com/xgf-dktw-jpa

Hours	Oral Presentation Speakers	Presentation Titles	E-Mails
10:00 10:10	BERNOU Ismahen	Limit theorems for dependent random variables with infinite means	ismahen825@gmail.com
10:15 10:25	KHANCHOUC HE Fatima	All Nash equilibria and the best one of them in singleton congestion game (case of two resource)	fma707976@gmail.com
10:30 10:40	LAZRI Nouara	The composite Gamma Pareto distribution	lazri.nouara@essg-annaba.dz
10:45 10:55	BECHIRI Sarra	Modélisation des montants de provisions pour sinistre à payer.	sarra.bechiri@outlook.fr
11:00 11:10	MAKHLOUF Khouloud	Model Uncertainty SPDEs Control and Application	khouloud.makhlouf@univ-biskra.dz, makhloufk787@gmail.com
11:15 11:25	GHOUAR Ahlem	Generation of random variables with compound version of the lindley distribution via the lambert w function.	ghouar.ahlem@essg-annaba.dz
11:30 11:40	LALLOUCHE Abdallah	On Modeling of Lifetime Data under Some Exponential Family Distributions	abdlallouche@gmail.com
11:45 11:55	MEZDOUD Zaineb	Hedging Option Under α -Hypergeometric Stochastic Volatility Model	zaineb.mezdoud@gmail.com
12:00 12:10	SOUAKRI roufaida	Statistical inference of periodic generalized poisson integer-valued time series	roufaidasouakri94@gmail.com
12:15 12:25	ROULA Amel	The matrix variate Pareto distribution	amel.roula@univ-jijel.dz
12:30 12:40	ABADA Lamia	Comparative Study to Calculate Mass Function Of $N_{\{n,k,l\}}$: Number of l-Overlapping Runs of Length k in Sequences of Binary Random Variables	abadalamia@yahoo.fr



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SCAN ME

Session A: Dynamical Systems and Chaos Chairs: Tarek HOUMOR and Rabah Bouden GoogleMeet Link: meet.google.com/htz-yuno-vmn

Hours	Oral Presentation Speakers	Presentation Titles	E-Mails
10:00 10:10	BACHMAR Aziza	Dynamic frictional contact of a electrovisco-plastic contact Problem	aziza.bachmar@univ-setif.dz
10:15 10:25	YAHY Amina	A new enhanced quadratic and logistic map using modular arithmetic and exponential function	aminayh994@gmail.com
10:30 10:40	DAIRA Ibtissem	Existence of positive periodic solution to nonlinear Lotka-Volterra competition systems on time scales	ibtissem.daira@gmail.com
10:45 10:55	GUEZZEN Cherifa	The basic reproduction numbers for a reaction diffusion model	cherifaguezzen@gmail.com
11:00 11:10	TOUATI Fatima	LIMIT CYCLES FOR A CLASS OF SECOND DIFFERENTIAL EQUATIONS VIA THE AVERAGING METHOD.	fatymars23@gmail.com
11:15 11:25	BEKADA Fouzia	Attractivity for Caputo--Fabrizio Random Fractional Differential Equations in Banach Spaces	bekadafouzia@gmail.com
11:30 11:40	BENAMAR Mohammed Nadjib	Solvability of Singular Fractional 2D Continuous-Time Linear Systems	nadjib.benamar.etu@univ-mosta.dz
11:45 11:55	AMIRA Rami	Synchronization of a novel chaotic fractional orders system with two quadratic nonlinearity	rami.amira@univ-tebessa.dz
12:00 12:10	BOUBEKEUR Maroua Amel	Forecast and Mathematical Modeling of COVID-19 in obese poeple	marwaamel.boubekour@gmail.com
12:15 12:25	BOUZERAA Seyf El Islam	The dynamics of the fractional chaotic Lozi map	s.bouzeraa@centre-univ-mila.dz
12:30 12:40	KAMECHE Amira	A general stability result for second-order stochastic evolution equation with infinite memory and time delay	a.kameche@univ-batna2.dz
12:45 12:55	BARKAT Meriem	Limit cycles of discontinuous piecewise differential systems via averaging theory	meriem.barkat@univ-bba.dz
13:00 13:10	MEZGHICHE Lynda	Periodic solutions of an iterative population model	linomezg3@gmail.com



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SCAN ME

Session B: Dynamical Systems and Chaos

Chairs: Mohammed Salah ABDELOUAHAB and Smail KAOUACHE

GoogleMeet Link: meet.google.com/eyz-uwng-kuo

Hours	Oral Presentation Speakers	Presentation Titles	E-Mails
10:00 10:10	BOURAFSA Safa	Routh-Hurwitz Conditions of Hopf Bifurcation	s.bourafa@centre-univ-mila.dz
10:15 10:25	BAYMOUT Louiza	Limit cycles bifurcated from piecewise differential systems formed by linear and non-linear weak focus	louiza.baymout@univ-bba.dz
10:30 10:40	ABDELOUAHA B Ahlem	ANALYSIS OF A FREE BOUNDARY PROBLEM FOR TUMOR GROWTH	ahlemabdelouahab98@gmail.com
10:45 10:55	BASTI Bilal	Application of Fractional Calculus in The Modeling of Biological Phenomena and Infectious Diseases	bilalbasti@gmail.com
11:00 11:10	HIOUAL Amel	Mittag-Leffler Stability of Nabla h-Discrete Fractional Neural Networks	amel.hioual@univ-oeb.dz
11:15 11:25	BADAOU Soufiane	Etude d'un modèle de compétition entre deux espèces de micro-organismes avec interaction intraspécifique dans un chemostat	soufianebeda1998@gmail.com
11:30 11:40	LADJEROUD Asma	The quasi-hyperbolic attractor in piecewise smooth maps	asma.ladjeroud@univ-tebessa.dz
11:45 11:55	DJENINA Nouredine	A simple criteria for test stability of incommensurate fractional order backward difference systems	nouredinedjenina1996@gmail.com
12:00 12:10	LAKEHAL Nadjet	Dynamics and Hybrid Synchronization of New Hyperchaotic System	nadjet.lakehal@univ-tebessa.dz
12:15 12:25	SOULA Yamina	Bifurcations and chaos in piecewise maps	h.soula@yahoo.fr
12:30 12:40	REZAIKI Nabil	Limit cycles coming from a uniform isochronous center	rnabil773@gmail.com
12:45 12:55	KHENNAOUI Amina Aicha	A Discrete-Memristor Based Grassi Miller Map and its Hardware Implementation	khennaouiamina@gmail.com

Application of Fractional Calculus in The Modeling of
Biological Phenomena and Infectious Diseases

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Abstract

In this paper, we discuss and provide some analytical studies for a mathematical model of fractional-order SEIRD for COVID-19 in the sense of the Caputo-Katugampola derivative. We compute and derive several stability results based on some parameters that satisfy some conditions that prevent the pandemic from occurring. The paper also investigates the problem of the existence and uniqueness of solutions for the SEIRD model. It does so by applying the properties of Schauder's and Banach's fixed point theorems.

1 Introduction

A better understanding and evaluation of the existence, stability and control of infectious diseases can be acquired through modeling them mathematically [1]. However, mathematical models' classical approaches are not highly accurate in modeling such diseases; hence, the introduction of fractional differential equations for handling these problems becomes necessary. Of their various applications in applied fields, we mention optimization problems, artificial intelligence, medical diagnoses, *etc.* For further reading on the subject, readers can refer to the following books (Samko et al. 1993 [2], Podlubny 1999 [3], Kilbas et al. 2006 [4], Diethelm 2010 [5]).

Motivated by many works; as SEIR and SIRD models [1, 6, 7], considering the vaccination factor v as a parameter of the vaccine of suspected population from the model SEIR, we add the exposed population $\mathfrak{E}$ and study the model SIRD under the Caputo-Katugampola fractional-order derivative, which unifies the Hadamard and Caputo fractional derivatives into a single form. For $0 < \alpha < 1$ and $\rho > 0$,

$$\begin{cases} {}^C\mathcal{D}_{0+}^{\alpha,\rho}\mathfrak{S}(t) &= -\frac{\beta}{N_0}\mathfrak{I}(t)\mathfrak{S}(t) - v\mathfrak{S}(t), \\ {}^C\mathcal{D}_{0+}^{\alpha,\rho}\mathfrak{E}(t) &= \frac{\beta}{N_0}\mathfrak{I}(t)\mathfrak{S}(t) - \delta\mathfrak{E}(t), \\ {}^C\mathcal{D}_{0+}^{\alpha,\rho}\mathfrak{I}(t) &= \delta\mathfrak{E}(t) - (\gamma + \kappa)\mathfrak{I}(t) \\ {}^C\mathcal{D}_{0+}^{\alpha,\rho}\mathfrak{R}(t) &= v\mathfrak{S}(t) + \gamma\mathfrak{I}(t), \\ {}^C\mathcal{D}_{0+}^{\alpha,\rho}\mathfrak{D}(t) &= \kappa\mathfrak{I}(t), \end{cases} \quad (1.1)$$

along with the positive initial conditions

$$\mathfrak{S}(0) = \mathfrak{S}_0, \mathfrak{E}(0) = \mathfrak{E}_0, \mathfrak{I}(0) = \mathfrak{I}_0, \mathfrak{R}(0) = \mathfrak{R}_0, \mathfrak{D}(0) = \mathfrak{D}_0, \quad (1.2)$$

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where β, δ, γ, v and κ are positive parameters, $\mathcal{N}_0 > 0$ is the initial total population at the moment $t = 0$, with $0 \leq t \leq T < \infty$. Parameters' definition of the SEIRD model for COVID-19 could be presented as follows:

- v is the vaccine of suspected population.
- β is the probably of changing from $\mathfrak{S}$ to $\mathfrak{E}$, and δ is the probably of changing from $\mathfrak{E}$ to $\mathfrak{I}$.
- γ is the probably of changing from $\mathfrak{I}$ to $\mathfrak{R}$, and κ is the rate of death population by COVID-19.

It is essential to find the solution of (1.1) with an efficient technique. Considering this point, our main goal in this work is to determine the main properties of the solution for the system of nonlinear fractional differential equations (1.1). First, checking the considered model's stability necessitates establishing some existence results, determining the boundedness and computing the disease-free equilibrium points. Then, by using the fixed point theory, we give the necessary conditions for getting at least one solution or its uniqueness.

2 Analysis for the SEIRD model of COVID-19

Here, we present the solution's feasibility region's discussion and equilibrium points' analysis.

Lemma 2.1. *The solution of the model under consideration is restricted to the feasible region given by*

$$u = \{(\mathfrak{S}, \mathfrak{E}, \mathfrak{I}, \mathfrak{R}, \mathfrak{D}) \in \mathbb{R}_+^5, 0 \leq \mathcal{N}(t) \leq \mathcal{N}_0\},$$

and no pandemic will occur in the following cases:

- *The exposed class $\mathfrak{E}$ is decreasing and*

$$\mathfrak{E}_0 < \frac{\gamma + \kappa}{\delta} \mathfrak{I}(t), \quad \forall t \geq 0.$$

- *The exposed class $\mathfrak{E}$ is increasing and*

$$\mathfrak{S}_0 < \frac{\gamma + \kappa}{\beta} \mathcal{N}_0,$$

where $\frac{\gamma + \kappa}{\beta}$ is called threshold phenomenon or critical community size for the pandemic.

Theorem 2.1. *The disease-free equilibrium point of (1.1) is*

$$u^* = \left(\frac{\gamma + \kappa}{\beta} \mathcal{N}_0, \frac{\gamma(\gamma + \kappa)\chi(v)}{\beta\delta} \mathcal{N}_0, \frac{\gamma\chi(v)}{\beta} \mathcal{N}_0, \chi(v) \mathfrak{R}_0, 0 \right),$$

where $\chi(v)$ is 1 if $v \neq 0$, and else is zero.

Theorem 2.2. *The pandemic free equilibrium point of (1.1) is globally asymptotically stable.*

3 Main work

In this section, we demonstrate the existence of a unique solution of the model (1.1) through the field point theory. Let $u = (\mathfrak{S}, \mathfrak{E}, \mathfrak{I}, \mathfrak{R}, \mathfrak{D}) \in E$, where $E = [C([0, T], \mathbb{R}_+)]^5$ is a Banach space equipped with the norm

$$\|u\|_E = \|\mathfrak{S}\|_\infty + \|\mathfrak{E}\|_\infty + \|\mathfrak{I}\|_\infty + \|\mathfrak{R}\|_\infty + \|\mathfrak{D}\|_\infty$$

and let $f = (f_1, f_2, f_3, f_4, f_5)$, be such that

$$\begin{cases} f_1(t, u(t)) &= -\frac{\beta}{N_0} \mathfrak{I}(t) \mathfrak{S}(t) - v \mathfrak{S}(t), \\ f_2(t, u(t)) &= \frac{\beta}{N_0} \mathfrak{I}(t) \mathfrak{S}(t) - \delta \mathfrak{E}(t), \\ f_3(t, u(t)) &= \delta \mathfrak{E}(t) - (\gamma + \kappa) \mathfrak{I}(t), \\ f_4(t, u(t)) &= v \mathfrak{S}(t) + \gamma \mathfrak{I}(t), \\ f_5(t, u(t)) &= \kappa \mathfrak{I}(t), \end{cases}$$

it is clear that the function $f \in ([0, T] \times E)^5$ is continuous.

By applying the Katugampola's fractional integral to both sides of the system (1.1), we get

$$\begin{cases} \mathfrak{S}(t) &= \mathfrak{S}_0 + \frac{\rho^{1-\alpha}}{\Gamma(\alpha)} \int_0^t \frac{\tau^{\rho-1}}{(t^\rho - \tau^\rho)^{1-\alpha}} f_1(\tau, u(\tau)) d\tau, \\ \mathfrak{E}(t) &= \mathfrak{E}_0 + \frac{\rho^{1-\alpha}}{\Gamma(\alpha)} \int_0^t \frac{\tau^{\rho-1}}{(t^\rho - \tau^\rho)^{1-\alpha}} f_2(\tau, u(\tau)) d\tau, \\ \mathfrak{I}(t) &= \mathfrak{I}_0 + \frac{\rho^{1-\alpha}}{\Gamma(\alpha)} \int_0^t \frac{\tau^{\rho-1}}{(t^\rho - \tau^\rho)^{1-\alpha}} f_3(\tau, u(\tau)) d\tau, \\ \mathfrak{R}(t) &= \mathfrak{R}_0 + \frac{\rho^{1-\alpha}}{\Gamma(\alpha)} \int_0^t \frac{\tau^{\rho-1}}{(t^\rho - \tau^\rho)^{1-\alpha}} f_4(\tau, u(\tau)) d\tau, \\ \mathfrak{D}(t) &= \mathfrak{D}_0 + \frac{\rho^{1-\alpha}}{\Gamma(\alpha)} \int_0^t \frac{\tau^{\rho-1}}{(t^\rho - \tau^\rho)^{1-\alpha}} f_5(\tau, u(\tau)) d\tau. \end{cases}$$

By choosing $u_0 = (u_1, u_2, u_3, u_4, u_5) = (\mathfrak{S}_0, \mathfrak{E}_0, \mathfrak{I}_0, \mathfrak{R}_0, \mathfrak{D}_0)$, we get

$$u(t) = u_0 + \frac{\rho^{1-\alpha}}{\Gamma(\alpha)} \int_0^t \frac{\tau^{\rho-1}}{(t^\rho - \tau^\rho)^{1-\alpha}} f(\tau, u(\tau)) d\tau. \quad (3.1)$$

In what follows, we present the principal theorems:

Theorem 3.1. Let $\beta, \gamma, \delta, \kappa, v, \alpha, \rho, T \in \mathbb{R}_+$, be such that $\alpha \in (0, 1)$ and

$$T < \left(\frac{\rho^\alpha \Gamma(\alpha + 1)}{5(\beta + \gamma + \delta + \kappa + v + 4)} \right)^{\frac{1}{\rho\alpha}}, \quad (3.2)$$

then the problem (1.1)–(1.2) has at least one solution on $[0, T]$.

Theorem 3.2. Let $\alpha \in (0, 1)$ and $\beta, \gamma, \delta, \kappa, v, \mu, \rho, T \in \mathbb{R}_+$, be such that

$$\mu = \max \{ \beta + v + 3, \beta + \delta + 2, \delta + \gamma + \kappa + 3, v + \gamma + 3, \kappa + 4 \}.$$

If

$$\frac{5\mu T^{\rho\alpha}}{\rho^\alpha \Gamma(\alpha + 1)} < 1, \quad (3.3)$$

then the problem (1.1)–(1.2) admits a unique solution on $[0, T]$.

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- [2] S. G. Samko, A. A. Kilbas and O. I. Marichev, *Fractional Integral and Derivatives (Theory and Applications)*, Gordon and Breach, Switzerland, 1993.
- [3] I. Podlubny, *Fractional Differential Equations*, Mathematics in Science and Engineering, Academic Press, New York, 1999.
- [4] A. A. Kilbas, H. H. Srivastava and J. J. Trujillo, *Theory and Applications of Fractional Differential Equations*, Elsevier Science B.V, Amsterdam, 2006.
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- [6] S. Annas, M. I. Pratama, M. Rifandi, W. Sanusi and S. Side, *Stability analysis and numerical simulation of SEIR model for pandemic COVID-19 spread in Indonesia*, Chaos, Solitons and Fractals, **139** (2020), 110072.
- [7] B. Basti, N. Hammami, I. Berrabah, F. Nouioua, R. Djemiat and N. Benhamidouche, *Stability analysis and existence of solutions for a modified SIRD model of COVID-19 with fractional derivatives*, Symmetry, **13**(8) (2021), 1431.