TUNISO-LIBANESE WORKSHOP IN CONTROL THEORY AND RELATED FIELDS

This conference is focused in the control theory and Related Fields.
The conference is composed of invited talks, short talks and posters.

Organizing comittee

Kaïs AMMARI, UR Analysis and Control of PDE, University of Monastir, Tunisia
Ali WEHBE, University of Beirut, Lebanon

Sponsors

- University of Monastir, Tunisia
- UR13ES64, "Analysis and Control of PDE", University of Monastir, Tunisia
- AUF
- Lebanese University

Program

Wednesday, October 30, 2019

8h00-8h30: Welcoming participants
9h00-9h40: Karim El Mufti (Manouba & Monastir)
Observability and stabilization of the wave equation with moving boundary or pointwise
9h40-10h00: Hawraa Alsayed (Beirut & Poitiers)
Finite difference scheme for 2d parabolic problem modelling electrostatic micro-electromechanical systems
10h00-10h10: Maroi Cheriaa (Monastir)
Stabilization of Kirchhoff's equations
10h10-10h20: Ibtissam Issa (Beirut)
Stabilization of thermo-elastic transmission problem
10h20-10h30: Smain Moulai Khatir (Monastir & Sidi Bel Abbès)
Well-posedness and exponential stability of a thermoelastic system with internal delay
10h30-10h50: Coffee Break
10h50-11h30: Zainab Abbas (Beirut)
Stabilization of second order evolution equations by unbounded dynamic feedbacks
11h30-11h50: Naima Mehenaoui (Tunis El Manar)
Exponential stability for the nonlinear Schrödinger equation on a star-shaped network
11h50-12h: Mouhammad El Joubbel (Beirut)
A new proof of menger's theorem
12h-12h10: Sara Nasser (Beirut)
Path with two blocks
12h10-12h20: Walid Bougjamda (Tunis El Manar)
Boundary stabilization and Riesz basis generation of two strings connected by a point Mass with variable coefficients
12h20-14h00: Lunch
14h00-14h40: Mohammad Akil (Beirut)
Stability of wave equations with fractional damping
14h40-15h: Maâli Zaghdoudi (Carthage)
On the polynomial stabilizability by optimal control
15h-15h20: Alaa Hayek (Beirut & Valenciennes)
Stabilization of a generalized telegraph equation on star shaped networks
15h20-15h50: Coffee Break and posters session
15h50-16h30: Akram Ben Aissa (Monastir)
Stabilization of viscoelastic wave equation with dynamic boundary conditions
16h30-16h40: Mourad Hrizi (Monastir)
A non-iterative reconstruction method for an inverse problem modeled by a Stokes-Brinkmann equations
16h40-16h50: Amel Berhail (Guelma)
Study of ILC control for a class of fractional differential equations
16h50-17h: Ahcene Merad (Oum El Bouaghi)
A priori estimates of solutions for fractional differential equations with boundary integral conditions

17h-17h10: Imed Rezzoug (Oum El Bouaghi)
Null-controllability with constraints on the control
17h10-17h20: Tayeb Hamaizia (Oum El Bouaghi)
Fixed point theorems via c-class function in b-metric spaces
17h20-17h30: Zineb Sabbagh (Alger)
Etude de l'existence globale et du comportement asymptotique de la solution d'une équation d'évolution non-linéaire avec un retard distribué

Thursday, October 31, 2019

9h00-9h40: Azgal Abichou (Carthage)
Construction de feedbacks stabilisants pour quelques systèmes physiques
9h40-10h00: Rayan Nasser (Beirut & Brest)
Stabilization of a wave equation with localized internal Kelvin-Voigt type damping
10h00-10h10: Hichem Boughazi (Tlemcen)
Paneitz type equation
10h10-10h20: Atika Matallah (Tlemcen)
On critical elliptic Kirchhff type problems in unbounded domain
10h20-10h30: Mama Abdelli (Mascara)
Existence, uniqueness and global behavior of the solutions to some nonlinear vector equations in a finite dimensional Hilbert space
10h30-10h50: Coffee Break and poster session
10h50-11h30: Mouhammad Ghader (Beirut)
Optimal indirect stability of a weakly damped elastic abstract system of second order equations coupled by velocities
11h30-11h50: Monia Belhaj Salah (Monastir)
Stabilization of coupled wave equations with a boundary damping
11h50-12h: Safia Benmansour (Tlemcen)
On elliptic nonlocal problems with critical growth
12h-12h10: Kamel Tahri (Tlemcen)
GJMS operator on Riemannian manifolds
12h10-12h20: Badreddine Azzouzi (Tlemcen)
Etude asymptotique des processus linéaires pour des variables aléatoires dépendantes
12h20: Closing and lunch

Invited talks (40mn)

Zainab Abbas
University of Beirut, Lebanon

Stabilization of second order evolution equations by unbounded dynamic feedbacks

Abstract. In this talk, we discuss some sufficient conditions that lead to the uniform or non uniform stability of the solutions of the following closed loop system:

$$\begin{cases} x''(t) + Ax(t) + Bu(t) = 0, t \in [0, +\infty), \\ \rho u'(t) - \hat{C}u(t) - B^* x'(t) = 0, t \in [0, +\infty), \\ x(0) = x_0, x'(0) = y_0, u(0) = u_0, \end{cases} \tag{1}$$

where A is a linear unbounded positive self-adjoint operator, $x : [0, +\infty) \to X$ is the state of the system, $\hat{C}$ is a m-dissipative operator on U (X and U are two Hilbert spaces) and $u \in L^2(0, T; U)$ is the input function. System (1) provides a general framework of second order evolution equations with dynamical feedbacks covering a variety of examples. We indeed associate to our damped problem an undamped problem and prove that under certain regularity assumption,the observability properties for the undamped problem imply decay estimates for the damped one.

Azgal Abichou
University of Carthage, Tunisia

Construction de feedbacks stabilisants pour quelques systèmes physiques

Abstract. TBA

Mohammad Akil
University of Beirut, Lebanon

Stability of wave equations with fractional damping

Abstract. In this talk, we consider a system of wave equations with fractional damping. First, we consider a multidimensional wave equation with fractional damping acting on a part of the domain. Using frequency domain approach combining with multiplier method and by assuming that the boundary control region satisfy some geometric conditions and by using the exponential decay of the wave equation with a standard damping, we establish an optimal polynomial energy decay rate for smooth solutions, which depends on the order of the fractional derivative. Next, we consider a system of two wave equations coupled by velocities in one-dimensional space, with one boundary fractional damping. Using frequency domain approach combining with multiplier method, we prove that the energy decay rate is greatly influenced by the nature of the coupling parameter b, the arithmetic property of the ratio of the wave propagation speeds a, the order of the fractional damping α.

Akram Ben Aissa
University of Monastir, Tunisia

Stabilization of viscoelastic wave equation with dynamic boundary conditions

Abstract. We consider the viscoelastic wave equation with dynamic boundary condition in a bounded domain, we establish a general decay result of energy by exploiting the frequency domain method which consists in combining a contradiction argument and a special analysis for the resolvent of the operator of interest with assumptions on past history relaxation function.

Karim El Mufti
University of Manouba & Monastir, Tunisia

Observability and stabilization of the wave equation with moving boundary or pointwise feedback

Abstract. We deal with the one dimensional wave equation in a bounded interval with a moving interior or a boundary point a(t). Here a(t) is assumed to move slower than the light and periodically. We survey the results of observation and stabilization problems.

Mouhammad Ghader
University of Beirut, Libanon

Optimal indirect stability of a weakly damped elastic abstract system of second order equations coupled by velocities

Abstract. In this talk, by means of the Riesz basis approach, we study the stability of a weakly damped system of two second order evolution equations coupled through the velocities. This system takes the following form

$$u_{tt} + aAu + A^{\gamma}u_t + \alpha y_t = 0,$$
$$y_{tt} + Ay + \alpha u_t = 0,$$

where α is non zero real number, $a > 0, \gamma \leq 0$ and A is a self-adjoint coercive operator in a separable Hilbert space H. If the fractional order damping becomes viscous and the waves propagate with equal speeds, we prove exponential stability of the system and, otherwise, we establish an optimal polynomial decay rate. Finally, we provide some illustrative examples.

Invited talks (20mn)

Hawraa Alsayed
University of Beirut & Poitiers

Finite difference scheme for 2D parabolic problem modelling electrostatic micro-electromechanical systems

Abstract. This paper is dedicated to study the fully discretized semi implicit and implicit schemes of a 2D parabolic semi linear problem modeling MEMS devices. Starting with the analysis of the semi-implicit scheme, we proved the existence of the discrete solution which converges under certain conditions on the voltage lambda. On the other hand, we consider a fully implicit scheme, we proved the existence of the discrete solution, which also converges to the stationary solution under certain conditions on the voltage lambda and on the time step. Finally, we did some numerical simulations which show the behavior of the solution.

Monia Belhaj Salah
University of Monastir, Tunisia

Stabilization of coupled wave equations with a boundary damping

Abstract. In this talk we study the stabilization of two coupled wave equations with a damping condition at the boundary. In the first equation we suppose the existence of a positive density ρ. Therefore, we consider the following system

$$\begin{cases} \rho^2\,\partial_t^2 u_1(x,t) - \partial_x^2 u1(x,t) + \partial_t u_2(x,t) = 0,\ (0,1)\times(0,+\infty), \\ \partial_t^2 u_2(x;t) - \partial^2 x u_2(x,t) - \partial_t u_1(x,t) = 0,\ (0,1)\times(0,+\infty), \\ u_1(0,t) = 0, u_2(0,t) = u_2(1,t) = 0,\ t\in(0,+\infty), \end{cases}$$

with the following initial conditions

$$u_1(x,0) = u_1^0(x), \partial_t u_1(x,0) = u_1^1(x), u_2(x,0) = u_2^0(x), \partial_t u_2(x,0) = u_2^1(x)$$

and the boundary dissipation law

$$\partial_x u_1(1,t) + \partial_t u_1(1,t) = 0,\ t\in(0,+\infty).$$

We give the asymptotic expansion of the eigenvalues of the infinitesimal generator of the associated semigroup near the imaginary axis. Moreover, using the frequency domain approach combined with a multiplier method, we establish the uniform stability of the system when $\rho = 1$ and a polynomial energy decay rate of type $1/\sqrt{t}$ if ρ is a rational number.

Alaa Hayek
University of Beirut & Valenciennes

Stabilization of a generalized telegraph equation on star shaped networks

Abstract. The purpose of this talk is to investigate the stabilization of a generalized telegraph equation set on one dimensional star shaped networks. A dissipative boundary condition is applied at all the external vertices. At the common internal vertex, an improved Kirchhoff law is considered. First, we prove that our system is strongly stable. Next, using a frequency domain approach, we show that the energy of the system decays exponentially to zero.

Naima Mehenaoui
University of Tunis El Manar, Tunisia

Exponential stability for the nonlinear Schrödinger equation on a star-shaped network

Abstract. In this talk, we consider the one-dimensional nonlinear dissipative Schrödinger equation on a star-shaped network and where the damping is localized on one branch and at the infinity. Our major concern will be to prove the exponential decay of the global energy at the infinity.

Rayan Nasser
University of Beirut & Brest

Stabilization of a wave equation with localized internal Kelvin-Voigt type damping

Abstract. In this talk, we study the stability of a wave equation with locally internal Kelvin-Voigt type damping. First, we consider the mono-dimensional case. We take the transmission problem of a wave equation with viscoelastic damping where the damping mechanism is localized internally and not in any neighborhood of the boundary. We establish a polynomial decay rate of the energy of type t^{-4} and this decay is in some sense optimal. Second, we consider the stabilization of a multidimensional wave equation where the Kelvin-Voigt damping is interior and satisfies some geometric situations richer than those considered in "L. Tebou, A constructive method for the stabilization of the wave equation with localized KelvinVoigt damping, C. R. Acad. Sci. Paris, Ser. I 350 (11) (2012) 603–608; Q. Zhang, Polynomial decay of an elastic/viscoelastic waves interaction system, Z. Angew. Math. Phys. 69 (4) (2018) 88 and K. Liu, B. Rao, Exponential stability for the wave equations with local KelvinVoigt damping, Z. Angew. Math. Phys. 57 (3) (2006) 419–432". We also prove a polynomial stability of our system and we get an energy decay rate of type t^{-1}.

Maâli Zaghdoudi
University of Carthage, Tunisia

On the polynomial stabilizability by optimal control

Abstract. In this talk, we study the problem of polynomial stabilizability of nonlinear control systems by means of optimal feedback control. To handle the problem, several sufficient conditions are derived characterizing this polynomial stabilizability by optimal feedback laws. Our main result is applied on the class of control systems with drift, where optimal feedback laws are built stabilizing partially these systems with the rate decay $\frac{1}{t^{\alpha}}, \alpha > 0$.
To avoid the complexity of solving the Hamilton—Jacobi—Bellman equation, the inverse optimal approach seems crucial for many nonlinear control systems with drift. In this context, an inverse optimal feedback laws are constructed with respect to a meaningful cost and stabilizing polynomially in partial sense this type of systems. Several physical examples as well as rigid spacecraft with one axe of symmetry, Brockett's integrator are solved.

Short Talks (10 mn)

Mama Abdelli
University of Mascara, Algeria

Existence, uniqueness and global behavior of the solutions to some nonlinear vector equations in a finite dimensional Hilbert space

Abstract. The initial value problem and global properties of solutions are studied for the vector equation: $\left\|A^{1/2}u\right\|^{\beta} Au + g(u_t) = 0$ in a finite dimensional Hilbert space under suitable assumptions on g.

Bedreddine Azzouzi
University of Tlemcen, Algeria

Etude asymptotique des processus linéaires pour des variables aléatoires dépendantes

Abstract. Let $\{Y_i, -\infty < i < +\infty\}$ be a doubly infinite sequence of identically distributed and ψ-mixing random variables with zero means and finite variance and $\{a_i, -\infty < i < +\infty\}$ an absolutely summable sequence of real numbers. In this talk, we prove the complete moment convergence of

$$\left\{\sum_{k=1}^{+\infty}\sum_{i=-\infty}^{+\infty} a_{i+k}Y_i/n^{1/p}; n \geq 1\right\}$$

under some suitable conditions.

Safia Benmansour
University of Tlemcen, Algeria

On elliptic nonlocal problems with critical growth

Abstract. In this talk, we establish the existence and the multiplicity of positive solutions for a class for elliptic problems of Kirchhoff type involving critical Sobolev exponent, we use variational methods.

Amel Berhail
University of Guelma, Algeria

Study of ILC control for a class of fractional differential equations

Abstract. In this talk, we discuss P D-type learning control law for some differential equations of fractional order, we study convergence results of open-loop and closed-loop iterative learning schemes with zero initial error and random but bounded initial error.

Walid Boughamda
University of Tunis El Manar, Tunisia

Boundary Stabilization and Riesz Basis Generation of Two Strings Connected by a Point Mass with Variable Coefficients

Abstract. We study the Riesz basis property and the problem of stabilization of two vibrating strings connected by a point mass with variable physical coefficients, under a boundary feedback control acts at one extreme point and Dirichlet boundary condition on the other end. It is shown that the system has a sequence of generalized eigenfunctions which forms a Riesz basis for the state Hilbert space. By a detailed spectral analysis, it is proved that this hybrid system is asymptotically stable but not exponentially stable.

Hichem Boughazi
University of Tlemcen, Algeria

Paneitz type equation

Abstract. Let (M; g) be a smooth compact Einstein manifold of dimension n 5, denote Lg the Paneitz-Branson operator. In this work, we show that there exists a nodal solution of the nonlinear Paneitz-Branson type equation Lgw = k—w—N-2w where k is a constant and N is the critical Sobolev exponent. Keywords: Functional analysis, Paneitz operator, eigenvalues, nodal solution.

Maroi Cheriaa
University of Monastir, Tunisia

Stabilization of Kirchhoff's equations

Abstract. In this work we are concerned with the existence of strong solution, $u = (u_1, ..., u_N)$, and exponential decay of the energy for the initial boundary value problem associated with the quasilinear wave equations with nonlinear source.

$$\partial_t^2 u_j - \left(a_j + b_j \int_0^{\ell_j}\right) \partial_x^2 u_j = \mu_j |u_j|^{q-1} u_j,\ (0, \ell_j) \times (0, +\infty), j = 1, ..., N.$$

Where $a_j > 0, b_j > 0, q > 1$ and $\mu_j \in \mathbb{R}_+$. The results are proved by means of the potential well method, the multiplier technique and suitable unique continuation theorem for the wave equation with the variable coefficient.

Mouhammad El Joubbel
University of Beirut, Lebanon

A new proof of menger's theorem

Abstract. The known Mengers theorem in K. Menger, Zur allgemeinen Kurventheorie, Fund. Math., 10 (1927) 96 115 states that in a nite graph, the size of a minimum separator set of any pair of vertices is equal to the max-imum number of disjoint paths that can be found between these two vertices. In our work, we study the minimal separators of two non-adjacent vertices in a nite graph, and we give a new elementary proof of Menger's theorem.

Tayeb Hamaizia
University of Oum El Bouaghi, Algeria

Fixed point theorems via c-class function in b-metric spaces

Abstract. In this talk we prove fixed point theorems under C-class function in the context of b-metric spaces. Our Theorems generalize some well-know results.

Mourad Hrizi
University of Monastir, Tunisia

A non-iterative reconstruction method for an inverse problem modeled by a Stokes-Brinkmann equations

Abstract. This talk is concerned with the reconstruction of obstacle ω immersed in a fluid flowing in a bounded domain in the two dimensional case. We assume that the fluid motion is governed by the Stokes-Brinkmann equations. We make an internal measurement and then have a least-square approach to locate the obstacle. The idea is to rewrite the reconstruction problem as a topology optimization problem. The existence and the stability of the optimization problem are demonstrated. We use here the concept of the topological gradient in order to determine the obstacle and it's rough location. The topological gradient is computed using a straightforward way based on a penalization technique without the truncation method used in the literature. The unknown obstacle is reconstructed using a level-set curve of the topological gradient. Finally, we make some numerical examples exploring the efficiency of the method.

Ibtissam Issa
University of Beirut, Lebanon

Stabilization of thermo-elastic transmission problem

Abstract. The energy decay rate of a 1-d thermo-elastic system is considered. The system consists of two parts, elastic and thermo-elastic parts and there is coupling with each one of these equations. These equations are coupled at the interface under certain transmission conditions. We prove the strong stability of the system and that the system decays polynomially.

Atika Matallah
University of Tlemcen, Algeria

On critical elliptic Kirchhff type problems in unbounded domain

Abstract. In this talk, we use variational methods to prove the existence of positive solutions for elliptic Kirchhoff type problem with critical Sobolev exponent in $\mathbb{R}^3$.

Ahcen Merad
University of Oum El Bouaghi, Algeria

A priori estimates of solutions for fractional differential equations with boundary integral conditions

Abstract. In this talk, we study the existence and uniqueness of a solution for time order partial fractional dierential equations with boundary integral conditions. By using the method of energy inequalities, we need a priori estimates and the density of the range of the operator generated by given the problem.

Sara Nasser
University of Beirut, Lebanon

Path with two blocks

Abstract. A maximal outforest of a digraph has proven to be a very effective tool which can be used in order to determine or at least study the structure of a digraph. In this paper, we try to characterize maximal outforests of a digraph and their impact on the connection between colorings and the structure of the digraph. Especially, we study the behavior of circuits in digraphs with respect to their levels in a maximal outforest, which will help in reaching an elementary proof of El Sahili's conjecture concerning the existence of a path with two blocks in an n-chromatic digraph of length $n-1$ with $n \geq 4$.

Smain Moulai Khatir
University of Sidi Bel Abbes, Algeria

Well-posedness and exponential stability of a thermoelastic system with internal delay

Abstract. In this talk we consider a one dimensional thermoelastic system with interior time delay where the heat conduction is given by the Fourier low. At first, we prove the well-posedness of the system by the semigroup theory. Next, under appropriate assumptions on the time delay, we prove the exponential stability of the system by introducing a suitable Lyapunov functional.

Imad Rezzoug
University of Oum El Bouaghi, Algeria

Null-controllability with constraints on the control

Abstract. We study a problem of null-controllability for the parabolic heat equation with linear constraints on the control. The main tool used to solve the problem of existence and convergence is an observability inequality of Carleman type, which is adapted to the constraints. We then apply the obtained results to the sentinels theory of Lions.

Zineb Sabbagh
University of Alger, Algeria

Etude de l'existence globale et du comportement asymptotique de la solution d'une équation d'évolution non-linéaire avec un retard distribué

Abstract. Cet exposé est consacré à l'étude de l'existence globale d'une solution faible et son comportement asymptotique pour un modèle de plaques minces viscoélastiques non-linéaire de type Petrovsky avec un retard interne distribué. On démontre que l'énergie associée à notre système décroît vers zéro de manière exponentielle quand le temps tend vers l'infini. Dans un premier temps, on étudie l'éxistence globale d'une solution faible du problème avec conditions aux limites de Dirichlet, en utilisant la méthode de Faedo-Galerkin. Ensuite, on démontre la décroissance exponentielle de l'énergie du système considéré sous des conditions raisonables sur les données. La stabilité de la solution est obtenue en utilisant la méthode de Lyapunov.

Kamel Tahri
University of Tlemcen, Algeria

GJMS operator on Riemannian manifolds

Abstract. In this talk, motivated by the work of A .Ambrosetti and J. G. Azorero, Multiplicity results for nonlinear elliptic equations, *J. Funct. Anal.,* **137** (1996), 219–242, we extend some results known for the second order operator to the GJMS operator.

Posters

Badreddine Azzouzi
University of Tlemcen, Algeria

Estimation d'un processus linéaire chronologique

Abstract. Us studying a method to estimate a parameter for a mobile average process (MA). one using a parametric estimator, is based on a maximization of function of probability. As a .rst stage, we suppose that the initial values are .xed number, and in the second phase, we suppose that the initial values are random variables with the use of the estimators of least squares (LS). In the continuation of my research task, I am spirit studied the case of the estimtion of certain caracterestic for an autoregression process, and to also study the noises white in the case depending and to see their behavior ad in.nitum (asymptotiquements independent for example: alpha, mixing beta).

Amin Benaissa
University of Oran, Algeria

Sobolev Spaces on Time Scales

Abstract. In this work, We present a generalization of the density some of the functional spaces on the time scale, for example, spaces of rd-continuous function, spaces of Lebesgue -integral and first-order Sobolev's spaces.

Hayat Benchira, Safia Benmansour and Atika Matallah
University of Tlemcen, Algeria

Multiple solutions for Kirchhoff problem involving critical nonlinearity in $\mathbb{R}^3$

Abstract. In this work, we use variational methods to study the existence and multiplicity of solutions for a nonhomogeneous p-Kirchhoff equation involving the critical Sobolev exponent.

Tayeb Blouhi and Mohamed Ferhat
University of Sidi Bel Abbes, Algeria & University of Oran, Algeria

Coupled System of Impulsive Stochastic Semilinear Differential Inclusions driven Poisson Jumps

Abstract. In this work we prove the existence of mild solutions for a first-order impulsive semilinear stochastic differential inclusion with an infinite-dimensional Poisson jumps. We consider the case convex. The results are obtained by using fixed point theorems for multivalued mappings, more precisely, the technique is based on a multivalued version of a nonlinear alternative of Leray-Schauder's fixed point theorem in generalized Banach spaces. Key words and phrases Mild solutions, Poisson jumps, impulses, matrix convergent to zero, generalized Banach space, fixed point, set-valued analysis, differential inclusions.

Tahar Bouali
University of Tebessa, Algeria

Existence of weak solution for impulsive fractional problem via topological degree theory

Abstract. The purpose of this work is to establish the existence of at least one weak solution, for a fractional boundary value problems. The approach is fully based on the topological degree theory.

Hocine Braiki
University of Mascara, Algeria

On global existence and Asymptotic behaviour of solutions for an intgro-dierential equation with strong damping non linear

Abstract. In this article we consider a nonlinear viscoelastic Petrovsky equation in a bounded domain with a strong damping. They prove the existence of weak solutions with initial boundary value conditions. Mean-while, they show that there are solutions under some conditions on initial data which blow up in nite time with non-positive initial energy as well as positive initial energy and give the lifespan estimates of solutions. In the absence of nonlinear source term.

Fatiha Chouaou
University of Tlemcen, Algeria

The Euler-Bernoulli beam equation with boundary dissipation of fractional derivative type

Abstract. We consider an Euler Bernoulli beam equation with a boundary control condition of fractional derivative type .We study stability of the system using the semigroup theory of linear operators and a result obtained by Borichev and Tomilov.

Rafik Guefaifia
University of Tebessa, Algeria

Existence of positive weak solutions for a new class of Kirchhoff elliptic systems with multiple parameters

Abstract. In this work, by using sub-super solutions method, we study the existence of weak positive solution for a new class of Kirchhoff elliptic systems in bounded domains with multiple parameters.

Lotfi Jouini
University of Tebessa, Algeria

On the dynamics and stabilization of a new three-dimensional fractional generalized Hénon map

Abstract. In this paper, we propose a fractional form of a new three-dimensional generalized Hénon map and study the existence of chaos and its control. Using bifurcation diagrams, phase portraits and Lyapunov exponents, we show that the general behavior of the proposed fractional map depends on the fractional order. We also present a control scheme to achieve the stabilization of the proposed fractional map.

Fares Kamache
University of Tebessa, Algeria

Existence of three solutions for a new class of fractional p-Laplacian boundary value systems

Abstract. In this work, by using the varational methods and critical point theorem due to Bonanno and Marano, the existence of at least three weak solutions is proved for a class of nonlinear fractional systems of p-Laplace type depending on two parameters. Two numerical examples are given to illustrate the applications of the main results.

Naima Keddar
University of Tlemcen, Algeria

Solutions for nonhomogeneous singular elliptic equations involving critical caffarelli-kohn-nirenberg exponent

Abstract. In this work, we consider a nonhomogeneous singular elliptic problem involving a critical Cafarelli-Kohn-Nirenberg exponent. We establish the existence of a ground state solution by using the Nehari manifold.

Khaled Khachnaoui
University of Monastir, Tunisia

Fast subharmonic and homoclinic solutions for a class of second-order differential equation

Abstract. In talk paper we are concerned with the existence of fast subharmonic and homoclinic solutions for the following second-order differential equation

$$\ddot{u}(t) + q(t)\dot{u}(t) - a(t)|u(t)|^{p-2} + \nabla V(t, u(t)) = 0,$$

where $t \in \mathbb{R}, u \in \mathbb{R}^N$, and $K, W \in C^1(\setminus \times \mathbb{R}^N, \mathbb{R})$ are T-periodic with respect to $t, T > 0$ and $q : \mathbb{R} \to \mathbb{R}$ is a continuous function and $Q(t) = \int_0^t q(s)ds$ with $\lim_{|t|\to+\infty} Q(t) = +\infty$. We assume that K satisfies the pinching condition and W satisfies a new superquadratic condition instead of the Ambrosetti-Rabinowitz condition. This result generalize and improve some existing findings in the known literature.

Fatima Zohra Ladrani
University of Oran, Algeria

Oscillatory for Certain Theorems of Higher-Order Neutral Dynamic Equations on Time Scales

Abstract. We will establish some oscillation criteria for the even-order nonlinear dynamic equation

$$(a(xn2))2(t) + (t, x(t)) = 0,$$

on a time scales T with n is an even integer 3, where and are the ratios of positive odd integer and a is areal valued rd-continuous function dened on T.

Taki Eddine Oussaeif
University of Oum El Bouaghi, Algeria

Solvability of a solution and approximate controllability for a class of Dirichlet problems of partial fractional differential systems

Abstract. In this paper, we study the existence, the uniqueness of a strong solution for a class of initial boundary value problems for a class of partial fractional parabolic differential system that include a fractional derivative of Caputo. The results are established by the application of the method based on a priori estimate "energy inequality" and the density of the range of the operator generated by the primal problem considered. Thus, we study the approximate controllability of dual problem by us-ing the method of regularization of Tikhonov. New concepts and results about controllability are established. Then, under the condition of the positivity of the controllability operator, we obtain that the linear system can be steered to an arbitrary small neighbourhood of the fractional integral of the state at final time.

Fares Yazid and Fatima Siham Djeradi
Laghouat University, Algeria

General decay of solutions in one-dimensional porous-elastic system with delay term

Abstract. By investigate to the work of Tijani A.A palara. In this present paper we consider a one-dimensional porous-elastic system with delay term in the second equation, with a single dissipation mechanism lacks exponential decay. Using the energy method, we prove exponential decay result of the solutions. Our result is new and improves previous results in the literature.

Sara Zouatnia and Nour Eddin Amroun
University of Tebessa, Algeria & University of Sidi Bel Abbes, Algeria

Nonlinear damped wave equation: Existence

Abstract. In this paper, we consider the following nonlinear wave equation with variable exponents:

$$u_{tt} - \Delta u + a(1 + |u_t|^{m(.)-2})u_t = bu|u|^{p(.)-2},$$

where a, b are positive constants. By using the Faedo-Galerkin method, the existence of a unique weak solution is established under suitable assumptions on the variable exponents m and p.