Abstract Proceeding

MOAD'2024

The Sixth International Colloquium on Methods and Tools for Decision Support

October 20th-22nd 2024

Mouloud Mammeri University of Tizi-Ouzou, Algeria.

The Selected papers of MOAD'2024 will be published in:

- Springer book series.
- Special issue in the RAIRO-Operations Research journal.

List of sponsors



(a) Mouloud Mammeri University of Tizi-Ouzou (UMMTO)



(c) Association "LE DEFI"



(e) Laboratory of Operational Research and Mathematics of Decision (LARO-MAD), UMMTO



(g) Mathematical Society of Algeria (SMA)



(b) Institut Français d'Algérie (IFA)



(d) Institute of Discoveries & Languages (IDL)



(f) Laboratory of Pure & Applied Mathematics, LMPA, UMMTO



(h) Ecole Supérieure du Groupe INSIM (EMTO)



Université Mouloud Mammeri de Tizi-Ouzou

Programme de la Conférence Internationale MOAD2024---20-22 octobre 2024

Lieu: Campus Tamda--Auditorium

Programme des conférences (08h-13h30)

	Dimanche 20 Octobre 2024							
N°	Horaire		Evènements					
1	08h00-09h000		Enregistrement					
2	09h00-09h30		Ouverture					
			Conférencier	Titre de la Conférence	Modérateur			
3	09h30-10h20	Conférence plénière	Pr. Djaffar OUDL ABDESLAM	Artificial Intelligence for Energy Consumption Reduction: The case of the Upper Rhine Region	Pr. Djamil AISSANI			
4	10h20-10h50			Pause Café				
5	10h50-11h40	Conférence plénière	Pr. Mourad BAIOU	Game theory models and algorithms for trading demands	Pr. Bachir SADI			
6	11h40-12h15	Conférence	Pr. Mohammed SBIHI	Mixed-integer quadratic programming formulations for computing the Lipschitz constant of ReLU networks	Pr. Mohammed AIDENE			
7	12h30-13h30		Déjeuner					
	Lundi 21 Octobre 2024							
N°	Horaire	Evènements	Conférencier	Titre de Conférence	Modérateur			
1	08h30-09h20	Conference Plénière	Pr. Brahim MEZERDI	Stochastic Mean-Field Control problems and Applications	Pr. Djamel HAMADOUCHE			
2	09h20-10h10	Conférence Plénière	Pr. Hacène BELBACHIR	Combinatorial properties for classes of Appell polynomials	Pr. Hocine Fellag			
3	10h10-10h40		Pause Café					
4	10h40-11h30	Conférence Plénière	Pr. Islam BOUSSAADA	Stabilisation prescrite de systèmes de dimension infinie : nouvelles perspectives de fonctions	Pr. Hisao FUJITA YASHIMA			
5	11h30-12h00	Conférence	Pr. Youcef ASKOURA	Moreau's sweeping process in separable Banach spaces	Pr. Mohammed MORSLI			
6	12h00-12h30	Conférence	Pr. Moussa AHMIA	Over \$(q,t)\$-bi\$^s\$nomial coefficients: Combinatorial properties and log-concavity	Pr. Sadek BOUROUBI			
7	12h30-13h30			Déjeuner				
				Mardi 22 Octobre 2024				
N°	Horaire	Evènements	Conférencier	Titre de Conférence	Modérateur			
1	08h30-09h20	Conférence Plénière	Pr. Yacine CHITOUR	Approximate and exact controllability criteria for linear 1D hyperbolic systems	Pr. Said DJENNOUNE			
2	09h20-10h10	Conférence Plénière	Pr. Emmanuel TRELAT	Exponential convergence towards consensus for non-symmetric linear first-order systems in	Pr Aissa AIBECHE			
3	10h10-10h40		Pause Café					
4	10h40-11h10	Conférence	Pr Amar DEBBOUCHE	Mathematical modelling for the dynamic of COVID-19 epidemic in discrete time	Pr. Abderrahmane YOUSFATE			
5	11h10-11h40	Conference	Pr. Abdelmouhcine SENGOUGA	On the energy behavior of strings with time-varying length and boundary damping	Pr. Leila RAHMANI			
	11h40-12h15	Conférence	Pr. Moussa LARBANI	Bimatrix Games under Uncertainty: A Survey	Pr. Mohand Said RADJEF			
6	12h15-13h00			Table ronde & Cloture	Pr. Moussa LARBANI			
7	13h00-14h00			Déjeuner				

Lieu: Campus Hasnaoua 2, Faculté des Sciences

Sessions Parallèles (Ateliers)--MOAD2024 14h30-18h00

Présentation Online Présentation Face-to-Face

1	Liou	Salla TR1	Sallo TR2	Salla TR2	Sollo TR4	Salla da Conf	Contro récolu	
	Lieu	Salle IP1	Salle IP2	Salle 1PS	Salle 1P4	salle de coni	centre reseau	1
	Horaire/Atelier	Atelier Prob. Stat	Atelier Optimisation	Atelier Graphe/Combinatoire	Atelier IA/Modélisation	Atelier SD/Controle/EDP	CR 1	CR2
	14h30-14h50	MEDDAHI SAMIA	Cherfaoui Yasmine	BEKKIS Chaima	Imad Eddine SAID	Sidhoumi Noura	Mehdaoui Abdelghani	Ghorab Elhouari
		Jump-Diffusion Parameters and Passage Times Estimation.	An integer programming aproach to portfolio optimization with indefinite quadratic fractional objective function. tion	Tiling interpretation of the generalized Fibonacci Colored composition	Advanced Approaches for Network Function Placement in the Cloud: Extended Results and In- Depth Analyses	Ricci Soliton of Four-Dimensional Lorentzian Damek- Ricci Spaces	Restricted Stirling numbers and chromatic polynomial	Algebra of generalized tempered ultradistributions of Roumieu type
	14h50-15h10	SADOUN Mohamed	FALI Fatima	FEGAS Syrine	Maamar OULADJ	Djamila BENAOUDIA	KESSOURI Ali	BELARBI MANSOUR
		Structure and inference in high-order self-excited multiple 4 thresholds GINAR models	Solving integer indefinite quadratic fractional bilevel programs	Full even k-complete partitions	Template Side-Channel Attacks with Spectral Computation	On a class of nonlocal problems arising in neutron transport theory	Over Mahonian numbers and log-concavity	Biharmonic curves in the 4-dimensional geometry
	15h10-15h30	BOUALAM KARIMA	ZERFA Lamia	SADAOUI Boualem	Mekhnache Yassine	Soumia BELARBI	Omar Abdelhak	Touati Mohamed
		Consistency of a geometric-type estimator for tail index under weak dependence	An Efficiency Test for Solutions to the Problem of Optimizing a Function over the Non-Dominated Set	Explicit values at non positive integers of multiple Hurwitz zeta functions	Practical Management of Instrumentation Inventory at3 SONATRACH: (Q, r) and (R, T) Models in an Industrial Context	A P-Laplacian Fractional Multi Point Boundary Value 4 Problem: Existence Of Solutions And Positive Solutions	Over Mahonian numbers and log-concavity	Existence and Multiplicity of Solutions for GJMS Operators (k=2 Paneitz-Branson Equations) on Non-Einstein Manifolds
	15h30-15h50	HARROUCHE Lyasmine	Thiziri SIFAOUI	BEKHTI Yamina	LARBI Sabiha	Abderrazak Nabti	Benatmane Sara	
202		Bayesian Loss Robustness of Exponential Models	Solving Sustainable Multi-objective Multi- choice Stochastic Transportation Problem	Influence Maximization Problem on Online Social Networks	Traffic Signal Timing Optimization with Genetic Algorithms: Modeling Techniques and Simulation Results.	Global Stability Analysis of an Age-Structured SEIR Model with Relapse	A New Cryptosystem using Zero Knowledge Proofs	
e	15h50-16h20	Pause caté (Hall de la Fac)					S	
pr	16h20-16h40	HADDADOU Kamilia	Boulebene Sabrin	Guettai Ghania	ELAROUSSI Mohammed	HADJ ALI Bahia		
) octo		Comparisn of Discordance Tests and Outlier Filtrtering Methods based on David and paulson's Performance Mesures	Approximate method for solving the dynamic multi-objective bin packing problem	Some Results for Appell Sequences	Splitting Argumentation Frameworks Based on Monophonic Convexity in Graphs	Modulating function-based fast convergent observer for the Coupled Tanks system.	s	
5	16h40-17h00	Kouadria Mohamed	IKHLEF MASSIKA	Ould-Mohamed Ryma	IBEGHOUCHENE Aldjia	ALOUANE Sofiane	i	
		Beta-Polynomial Exponential Model: Properties and Applications	Hybrid Evolutionary Metaheuristic Approach to the . Constrained Multiobjective Portfolio Optimization Problem	Cube polynomial of s-bonacci cubes	Data Modeling using Neural Networks	Backstepping control based on first-order sliding mode extended state observer for nonlinear systems with uncertainties	o n	
	17h00-17h20	ALIAT Billel	AMIROU Ahmed	BOUDJELDA Souhaib	SAHABI TOUFIK	HAMOUDI Ahcene		
		The Markov-switching periodic INARCH(q) process: Theory and application to unemployment data	Solving Semi-Infinite Programming by Discretization	Exact method for the bi-objective portfolio selection problem with risk-free asset	Calculation of Weibull parameters and function density simulation in region of Saida, (Algeria)	Proportional-Integral-Funnel Control for Mass on Car System	P	
	17h20-17h40	Khalfi Abderaouf	Fadila Leslous	Nacima Rosa AIT-AMRANE	Berkane Khelifa	Douali Taous	s	
		A Buffered transition approach for Nonlinear Stochastic Volatility Modeling	Innovative techniques for solving nonlinear multiplicative polynomial problems	A Novel Bicomplex Number System	Fractional Stochastic Differential Equation Model for Disease Dynamics	Evaluation of Lax-Friedrichs and MacCormack Numerical Schemes in Dam Break Simulation Using Saint-Venant Equations	t e	
	17h40-18h00	Mediani Mhammed	Slimani Sami	Boumesbah Asma	BERNINE Nassima	KHALILI Zineb	r	
		Stochastic Analysis of an SEIR Model for Measles with Saturation Recovery Rate and Ornstein-Uhlenbeck Process	A Comparison Between Genetic Algorithm (GA) and Ant Colony Optimization Algorithm (ACO) for Robot	Multiobjective Travel Salesman Problem: An exact approach	Simulation of a Web services discovery and composition system	Existence and stability results for laminated beam with3 Thermo-Visco-Elastic effect and a time varing delay term		

asma

Sessions Parallèles (Ateliers)--MOAD2024

	Lieu	Salle TP1	Salle TP2	Salle TP3	Salle TP4	Salle de Conf	Centre réseau	Centre réseau
	Horaire/Atelier	Atelier Prob. Stat	Atelier Optimisation	Atelier Graphe/Combinatoire	Atelier IA/Modélisation	Atelier SD/Controle	Sessions	Online
	14h30-14h50	Aicha Bareche	Younsi née Abbaci Leila	Amrouche Said	Ahmed Ait ameur	Messikh Chahrazed	Ben alia Sabira	Abdelaidoum Walid
		Ruin probability stability bounds in insurance using a semi-parametric method	Solving the Multi-Objective Stochastic Fractional Integer Programming Problem with Interval-Valued Coefficients	The incomplete Horadam sequence of order three	Modeling Interaction Point Processes Based on Minimum Distance	Decay result of the Timoshenko system with a fractional memory operator,	A nonlocal poisson model for image fusion	The Dimer Model: Analyzing the Connection Between Flips and Cycle transformations
	14h50-15h10	MERABET Dalila	Meddahi Meryem	KRIM Fariza	ZEDDAM Loukmane	Fatima DIB	Ameur habib	Ghemit Yousra
		Testing epidemic change in autoregressive process with dependent innovations	A hybrid iterative method for variational inequalities over fixed point sets of multimaps	Sums in the harmonic triangle	Impact of sudden torsional loading on a finite isotropic elastic material	Variational method for delay differential equations	Fractional differential equations on closed sets	Log-concavity of q-Mahonian numbers
	15h10-15h30	Bouchafaa Asma	Mohamed EL-Amine BENRABAH	Salah Eddine RIHANE	Nassima BELAGGOUN	Dib Karima	Kimouche Karima	Zaamoune Faiza
		Intercept-only Model under Non- normality	The SPC approach : Application of statistical indicators.	On. b-repdigits as product of consecutive Lucas members	Some Results on q-bi-periodic Fibonacci and Lucas Polynomials with Rogers-Ramanujan Type Identities	Characterization of weak invariance with respect to differential inclusions with time-dependent maximal monotone operators	A time varying BL process: approximation and derivative	A New Multi-spiral Hyperchaotic system Generating by Transformation without Equilibrium points with Hidden Coexisting Attractors
4	15h30-15h50	Bourouina Massilva	DJEBARA Sabiha	NADJI Mohammed Lamine	BENRABIA Imene	BEDJGUELEL Chabane	DEBBAH Isma	
re 202		Estimation of density and hazard rate functions in the case of three families of asymmetric kernels	Rough Set Approach to Constrained Bimatrix Game	Partitions into parts simultaneously regular and distinct	Bi-periodic Fibonomial Coefficients	Bifurcation analysis and dynamical systems	Smoothing Parameter Selection For A New Regression Estimator For Non-negative Data	
ē	15h50-16h20			Pause café (Hall de	e la Fac)		s	
8	16h20-16h40	AYHAR Chafiåa	KHELAIFIA Ouafa	Bazeniar Abdelghafour	Tilbi Djahida	Benzaid Rachid	P	
1 00		Numerical solution of Markov renewal equations in continuous time semi Markov process	Solving a bi-objective matroid problem	The generalized \$r\$-Stirling numbers of the first kind	The New Extended Rayleigh Distribution: Different Estimation Methods and Applications	Boundary stabilization for a coupled system of wave equations under fractional damping	s	
2	16h40-17h00	AUMORASSI Faroudja	CHEBBAH MOHAMMED	Boufelgha Ibrahim	Khemici mohamed	MAKHLOUF Amira	s	
		On numbers behind finite autoregressive process	New extensions methods for multi- objective stochastic fuzzy global optimization, algorithms (Software) and simulations.	Efficient broadcasts in cycles	Recursive kernel density estimation for positive time series under n-weak dependence	Existence theorem for differential inclusions involving time and stat dependent maximal monotone operators with an integral perturbation added to an unbounded set-valued perturbation	r o n	
	17h00-17h20	SLIMI Farida	SELLAM Idir	BELHADJ Samir	Omar Elfarouk Cherifi	Walid Remili	Р	
		On an analytical method for forcasting the coefficients of an AR(p)	Time optimal control on a coupled tank system	On a special case of the Vasyunin cotangent sum	Exponential inequality and strong laws for weighted sums of widely dependent random variables and application	Scaled Laguerre collocation method for solving high- order ordinary dierential equations on the half-line	o s	
	17h20-17h40	Farid AICHE	Adebayo Adeniran	TALEM Djamel	Akermi seif eddine	Allali Mohammed	t	
		An extension of statistical preference to fuzzy random variables using possibility and necessity.	Optimal control of Cocoa Black pod disease: A multi-pronged approach	A linear algorithm for enumerating all maximal bicliques of a bipartite distance hereditary graph	Predictive Modeling of Brucellosis Outbreaks in Algeria: Comparing SARIMA, NNAR, and Hybrid Models for Accurate Forecasting	Well-posedness and stability results for the korteweg- de vries equation in bounded domain.	e r	
	17h40-18h00	Elmossaoui hichem		Zaarat Ahlem		Berrighi Fatma		
		Using Marked Point Processes for Computer Experiment Design		Primal-Dual approach to optimizing linear problems		Exponential stability in the context of mild solutions for neutral impulsive functional evolution equations		

Université Mouloud Mammeri de Tizi-Ouzou

Programme de la Conférence Internationale MOAD2024---20-22 octobre 2024

Programme du 20 octobre 2024 (Sessions Poster): 15h50-17h30

1	Abdouche Safia	A prediction model based on multi-layer stacking Ensemble learning
2	Ait Mohammed Noura	Bayesian inference in autoregressive Models with trend under additive outliers contaminations
3	AOUDIA Samira	The geodetic number of a graph
		Existence, Uniqueness, and Approximate Controllability: Exploring Nonlinear Neutral Second Differential Equations under Q-Wiener
4	Aymen LESLOUS	Processes
5	BELHADJ AMEL	Sub Fractional Stochastic Volatility model
6	BERRAILES Ali	Algorithm for finding zeroes of maximal monotone operators
7	BOUGHRARA Sabrina	New contribution of Luria-Delbrück distribution
8	DAAMECHE IBRAHIM	Exponential stabilization of the full von Karman beam by a thermal effect and distributed delay
9	DEHAMNIA NASREDDINE	Performance analysis of an M_1, M_2 / G_1, G_2 / 1 retrial queue with persistent and impatient customers
10	DEHIMI Aimen	Modeling and analysis of multi-server queue with impatience under differentiated working vacations policy
11	GHERDAOUI Abdelaziz	SOME ESTIMATES FOR HARDY-STEKLOV TYPE OPERATORS
12	GRAICHE Farid	Testing epidemic change in the mean of weakly dependent random variables
13	LOUNI NASSIMA	Probabilistic Stirling numbers of normal distribution
14	MOKTEFI Lydia	Study of some evolution problems with delay terms
15	MOUSSOUNI Samia	Holderian approximation of the fractional brownian motion with lampert is criterian
16	NOURI Naima	Inverse problem of a dynamic system
17	Saliha BELAHCENE	The Pivot Adaptive Method for Solving Linear Programming Problems
18	Karima SLIMI	Almost Periodically Unitary Mild Solution to Abstract Semi-Linear SDEs
19	LADJIMI Fetima	A Case Of Recurrence In The Absolute Difference Chains With Heavy Tailed Increments
20	Fariza REZKI	Observer Design for Discrete-Time Nonlinear Systems by Using A State Augmentation Approach
21	Walid Remili	Scaled Laguerre collocation method for solving high-order ordinary differential equations on the half-line
22	Souad AMRANE	Insights on equidistributed real spectral values in first order delay system with two delays
23	Leila-Mabrouka ZEGHIDI	Information Criterion for Stationary Processes in Z*Z

Programme du 21 octobre 2024 (Sessions Poster): 15h50-17h30

r		
	AIT TAI FB Belkacem	Numerical Analysis of the Influence of a Uniform Horizontal Magnetic Field in a Square Cavity with Heat Sources and Hybrid Nanofluid:
1		Application of Partial Differential Equations
2	AKLOUCHE Fariza	Hull number of P5-diamond free graphs
3	ALIANE Mohamed	Direct method for solve fractional linear optimal control problems
4	Amira RAMADNA	The multiplicity-induced-dominancy for delay-differential equations with two delays
5	ARAB Hakim	Asymptotic modeling of the effect of a thin layer inserted between two elastic plates
6	BASTI bilal	Analysis of fractional model for infectious diseases with a focus on chronic conditions in Algeria
7	Baya Takhedmit	Machine Learning for Estimating Volatility
8	Becheroul Amina	Nonparametric estimation of the trend for stochastic differential equations driven by generalized mixed fractional Brownian motion
9	BEDOUHENE Kahina	Semiparametric von Mises kernel circular density estimator.
10	Benkhemmou Noria	On a New Approach for Solving a Knapsack Problem
11	BENNANI Cherifa	LMI conditions for observer-based stabilization of linear 4 discrete time systems with parameters uncertainties.
12	BIBI Hamza	Static Output Stabilization of Linear Systems with Parameter Uncertainties Enhanced LMI Conditions
13	BOUZIANE Houria	Infinite and Finite Step Relations Between the Prediction Coefficients
		Stability of an oscillated solutions for a delayed Nicholson's Blowflies equation with nonlinear Stepanov pseudo almost periodic
14	CHEBAB Mesbah	harvesting term
	Hammou Bouthina	Wall percentions problem for a fractional differential parabolic equation with non-local condition
15	Sabah	well-posedness problem for a fractional differential parabolic equation with non-local condition
16	HASSAINE Slimane	Extreme points and strict convexity of the Besicovitch-Orlicz space of almost periodic functions equipped with Luxemburg norm
17	HESSAS Fatima	On the Enumeration of Pattern Avoidance in Perfect Matchings and Convolved Perfect Matchings.
18	Lateb Nassim	Contextual Features' Importance and Selection for Effective Decision-Making in Movies Recommendation
19	Ramzi Kasri	Optimizing a multiobjective probability maximization problem under multivariate normal distributions
20	SI SALEM Abdelmadjid	A Principal component analysis for optimizing the design of sandwich structures under bending
21	ZERROUKI Djamel	Convex lower bound function for univariate nonconvex functions
22	ZINE Hassan	Some results in terms of convergence of closed operators in different spaces
23	Lamia CHOUCHANE	A Novel Fractional-Order Chaotic Memristive System and its Analysis

_* * * _____

Djaffar OULD ABDESLAM. Artificial Intelligence for Energy Consumption Reduction: The case of the Upper Rhine	Page 01. Region.
Mourad BAIOU. Game theory models and algorithms for trading demands.	Page 01.
Hacène BELBACHIR Combinatorial properties for classes of Appell polynomials.	Page 02.
Islam BOUSSAADA. Stabilisation prescrite de systèmes de dimension infinie : nouvelles perspectives de f hypergéométriques.	Page 02. Conctions
Yacine CHITOUR. Approximate and exact controllability criteria for linear 1-D hyperbolic systems.	Page 03.
Emmanuel TRÉLAT. Exponential convergence towards consensus for non symmetric linear first order systematic infinite dimensions.	Page 03. stems in
Brahim MEZERDI. Stochastic Mean-Field Control problems and Applications.	Page 04.
Mohamed SBIHI. Mixed-integer quadratic programming formulations for computing the Lipschitz com ReLU networks.	Page 05. Istant of
Youcef ASKOURA. Moreau's sweeping process in separable Banach spaces	Page 05.
Moussa LARBANI. Bimatrix Games under Uncertainty: A Survey.	Page 06.
Moussa Ahmia. Over (q, t)-binomial coefficients: Combinatorial properties and log-concavity	Page 06.
Amar DEBBOUCHE. Mathematical modelling for the dynamic of COVID-19 epidemic in discrete time	Page 07.
Abdelmouhcene SENGOUGA. On the energy behavior of strings with time-varying length and boundary damping	Page 07.

_____*** _____

Face to Face Presentation

Karima KIMOUCH.

A time varying BL process: approximation and derivative.

Massilva BOUROUINA. Estimation of density and hazard rate functions in the case of three families of kernels.	Page 08. asymmetric
Farid AICHE. An extension of statistical preference to fuzzy random variables using possibility a	Page 09. nd necessity.
Hind BOUREDJI. An improved kernel density estimator for univariate data	Page 09.
Meriem HOUALEF. Analysis of a single server queue in a multi-phase random environment with worki and customers' impatience.	Page 10. ng vacations
Mohamed Elamine BENRABAH. The SPC approach : Application of statistical indicators.	Page 10.
Lyasmine HARROUCHE. Bayesian Loss Robustness of Exponential Models.	Page 11.
Mohamed KOUADRIA,. Beta-Polynomial Exponential Model: Properties and Applications.	Page 11.
Kamilia HADDADOU. Comparison of Discordance Tests and Outlier Filtering Methods based on David as Performance Measures	Page 12. nd Paulson's
Karima BOUALAM. Consistency of a geometric-type estimator for tail index under weak dependence	Page 12.
Omar El Farouk CHERIF. Exponential inequality and strong laws for weighted sums of widely dependent rand and application	Page 13. om variables
Houria BOUZIANE. Infinite and Finite Step Relations Between the Prediction Coefficients	Page 13.
Khedidja DJABALLAH . Information Criterion for Stationary Processes in Z2	Page 14.
Asma BOUCHAFAA. Intercept-only Model under Non-normality	Page 14.
Samia MEDDAHI. Jump-Diffusion Parameters and Passage Times Estimation.	Page 15.
Ouardia Sabrina BENZAMOUCHE. kernel estimator of relative error regression function for twice censored and depen	Page 15. dent data.
Baya TAKHEDMIT. Machine Learning for Estimating Volatility.	Page 16.
Ahmed AIT AMEUR. Modeling Interaction Point Processes Based on Minimum Distance.	Page 16.
Chafiâa AYHAR. Numerical solution of Markov renewal equations in continuous time semi Markov	Page 17. process.
Farida SLIMI. On an analytical method for forcasting the coefficients of an AR(p).	Page 17.

Faroudja AUMORASSI. On numbers behind finite autoregressive process.	Page 18.
Amina BECHEROUL. Nonparametric estimation of the trend for stochastic differential equations driven by ge- mixed fractional Brownian motion.	Page 18. eneralized
Khemici KHEMICI. Recursive kernel density estimation for positive time series under η -weak dependence	Page 19. e.
Aicha BARECHE. Ruin probability stability bounds in insurance using a semiparametric method.	Page 19.
Kahina BEDOUHENE. Semiparametric von Mises kernel circular density estimator.	Page 20.
Isma DEBBAH. Smoothing Parameter Selection For A New Regression Estimator For Non-negative I	Page 20. Data.
Mhammed MEDIANI. Stochastic Analysis of an SEIR Model for Measles with Saturation Recovery Rate and Uhlenbeck Process.	Page 21. Ornstein-
Fetima LADJIMI. A Case Of Recurrence In The Absolute Difference Chains With Heavy Tailed Increm	Page 21. nents.
Mohamed Djemaa SADOUN. Structure and inference in high-order self-excited multiple thresholds GINAR models	Page 22.
Dalila MERABET. Testing epidemic change in autoregressive process with dependent innovations.	Page 22.
Hichem ELMOSSAOUI. Using Marked Point Processes for Computer Experiment Design.	Page 23.
Billel ALIAT. The Markov-switching periodic INARCH(q) process : Theory and application to unem data.	Page 23. ployment
Djahida TILBI. The New Extended Rayleigh Distribution: different estimation methods and Applica	Page 25. tions.
Abderaouf Khalf. A Buffered transition approach for Nonlinear Stochastic Volatility Modeling.	Page 25.
Meryem Meddahi . A hybrid method for variational inequalities over fixed point sets of multimaps.	Page 26.
MASSIKA IKHLEF. Hybrid Evolutionary Metaheuristic Approach to the Constrained Multiobjective Port timization Problem.	Page 26. folio Op-
Raouf ZIADI. An algorithm for continuous global optimization by dimensionality reduction.	Page 27.
Lamia ZERFA. An Efficiency Test for Solutions to the Problem of Optimizing a Function over Dominated Set.	Page 27. the Non-

Djamel ZERROUKI. Convex lower bound function for univariate non-convex functions.	Page 28.
Souhaib BOUDJELDA . Exact method for the bi-objective portfolio selection problem with risk-free asset.	Page 28.
Noria BENKHEMMOU. On a New Approach for Solving a Knapsack Problem.	Page 29.
Ramzi KASRI. Optimizing a multiobjective probability maximization problem under multivariate no tributions.	Page 29. rmal dis-
Asma BOUMESBAH. Multiobjective Traveling Salesman Problem: An exact Approach.	Page 30.
Idir SELLAM. Time optimal control on a coupled tank system.	Page 30.
Ali KESSOURI. Over Mahonian numbers and log-concavity.	Page 31.
Assia OUTAMAZIRT. Practical Management of Instrumentation Inventory at SONATRACH: (Q, r) and (R, els in an Industrial Context.	Page 31. T) Mod-
Ouafa KHELAIFIA. Solving a bi-objective matroid problem.	Page 32.
Fatima FALI. Solving integer indefinite quadratic fractional bilevel programs.	Page 32.
Ahmed AMIROU. Solving Semi-Infinite Programming by Discretization.	Page 33.
Thiziri SIFAOUI. Solving Sustainable Multi-objective Multi-choice Stochastic Transportation Problem.	Page 33.
Leila YOUNSI NÉE ABBACI. Solving the Multi-Objective Stochastic Fractional Integer Programming Problem with Valued Coefficients.	Page 34. Interval-
Yasmine CHERFAOUI. An Integer Programming Approach to Portfolio Optimization with Indefinite Quadra tional Objective Functions.	Page 34. atic Frac-
Meriem MAHAR. Template Side-Channel Attacks with Spectral Computation.	Page 35.
Zoubir RAMDANI. Method of feasible directions for solving linearly constrained multiobjective optimizat. lems.	Page 35. ion prob-
Ahlem ZAARAT. Primal-Dual approach to optimizing linear problems.	Page 36.
Sami SLIMANI. A Comparison Between Genetic Algorithm (GA) and Ant Colony Optimization A (ACO) for Robot Mobile Path Planning.	Page 36. lgorithm

MOHAMMED CHEBBAH. New extensions methods for multi-objective stochastic fuzzy global optimization, alg (Software) and simulations.	Page 37. gorithms
Said AMROUCHE. The incomplete Horadam sequence of order three.	Page 37.
Chaima BEKKIS. Tiling interpretation of the generalized Fibonacci Colored composition.	Page 38.
Abdelghafour BAZENIAR. The generalized \$r\$-Stirling numbers of the first kind	Page 38.
Ryma Ould-Mohamed. Cube polynomial of s-bonacci cubes.	Page 39.
Djamel TALEM. A linear time enumeration of all maximal bicliques of a 4 bipartite distance hereditar	Page 39. y graph.
Yamina BEKHTI. Influence Maximization Problem on Online Social Networks.	Page 40.
Ghania GUETTAI. Some Results for Appell Sequences.	Page 40.
Bilal BASTI. Analysis of fractional model for infectious diseases with a focus on chronic conditions in	Page 41. Algeria.
Salah Eddine RIHANE. On b-repdigits as product of consecutive Lucas members	Page 41.
Syrine FEGAS. Full even k-complete partitions.	Page 42.
N. Rosa AIT-AMRANE. A Novel Bicomplex Number System.	Page 42.
Fariza KRIM. Sums in the harmonic triangle.	Page 43.
Said AMROUCHE. The incomplete Horadam sequence of order three.	Page 43.
Mohammed Lamine NADJI. Partitions into parts simultaneously regular and distinct.	Page 44.
Boualem SADAOUI. Explicit values at non positive integers of multiple Hurwitz zeta functions.	Page 44.
Samir Belhadj. On a special case of the Vasyunin cotangent sum.	Page 45.
Ibrahim BOUFELGHA. Efficient broadcasts in cycles.	Page 45.
Nassima BELAGGOUN. A q-analogue of the bi-periodic Fibonacci and Lucas sequences and Rogers-Ramanu Identities.	Page 46. ijan type

Yassine MEKHNACHE. Practical Management of Instrumentation Inventory at SONATRACH: (Q, r) and Models in an Industrial Context.	Page 46. (R, T)
Imène Benrabia. Bi-periodic Fibonomial Coefficients	Page 47.
Sabiha DJEBARA. Rough Set Approach to Constrained Bimatrix Game.	Page 48.
Taous DOUALI. Evaluation of Lax-Friedrichs and MacCormack Numerical Schemes in Dam Break Sin Using Saint-Venant Equations.	Page 48. mulation
Abdelhakim LOUNACI. Analysis through Game Theory of the Impact of Natural Resource Rent Variability of tives to Reform.	Page 49. on Incen-
Farida ACHEMINE. Bimatrix Games under Uncertainty: A Survey.	Page 49.
Lyes TIGHZERT. A New Trajectory Planning Methode for Mobile Robots Inspired by Plant Intelligence	Page 50. e.
Mohammed ELAROUSSI. Splitting Argumentation Frameworks Based on Monophonic Convexity in Graphs.	Page 50.
Imad Eddine SAID. Advanced Approaches for Network Function Placement in the Cloud: Extended Res In-Depth Analyses.	Page 51. ults and
Loukmane ZEDDAM. Impact of sudden torsional loading on a finite isotropic elastic material.	Page 52.
Toufik SAHABI. Calculation of Weibull parameters and function density simulation in region of Saida, (A	Page 53. Algeria).
Bilal BASTI. Analysis of fractional model for infectious diseases with a focus on chronic conditions in	Page 53. Algeria.
Khelifa BERKANE. Fractional Stochastic Differential Equation Model for Disease Dynamics.	Page 54.
Abderrazak NABTI. Global Stability Analysis of an Age-Structured SEIR Model with Relapse.	Page 54.
Fadila LESLOUS. Innovative techniques for solving nonlinear multiplicative polynomial problems.	Page 55.
Amar DEBBOUCHE. Mathematical modelling for the dynamic of COVID-19 epidemic in discrete time.	Page 55.
Nassima BERNINE. Simulation of a Web services discovery and composition system.	Page 56.
Abir , KADI,. Modeling And Analysis Of Performance Measures For An M/M/1 Under N-Policy Vacation Balk	Page 56. Working

Abd Elhamid MEHAMDIA. Two new conjugate gradient methods with application in conditional model regression :	Page 57. function.
Sabiha LARBI. Traffic Signal Timing Optimization with Genetic Algorithms: Modeling Techniques as lation Results.	Page 57. nd Simu-
Seif Eddine AKERMI. .Predictive Modeling of Brucellosis Outbreaks in Algeria: Comparing SARIMA, NN Hybrid Models for Accurate Forecasting.	Page 58. AR, and
Sabira BEN ALIA. A Case Of Recurrence In The Absolute Difference Chains With Heavy Tailed Increm	Page 59. ents.
Hacen SERRAI. A Generalized Contraction Mapping Applied for Existence of the Generalized Sturm-I Langevin Equation.	Page 59. Liouville-
Hakim ARAB.	Page 60.
Asymptotic modeling of the effect of a thin layer inserted between two elastic plates.	Daga 60
Banach's fixed point theorem for studying space-fractional wave equations.	Fage 00.
Slimane HASSAINE. Extreme points and strict convexity of the BesicovitchOrlicz space of almost periodic f equipped with Luxemburg norm.	Page 61. functions
Mohamed TOUATI. Existence and Multiplicity of Solutions for GJMS Operators (k=2 Paneitz-Branson Economous Non-Einstein Manifolds.	Page 61. quations)
Fatma BERRIGHI. Exponential stability in the context of mild solutions for neutral impulsive functional equations.	Page 62. evolution
Habib AMEUR. Fractional differential equations on closed sets.	Page 62.
Abed YFRAH. Full-descretization and semi-descretization for a viscoelastic wave equation.	Page 63.
Belkacem AIT TALEB. Numerical Analysis of the Influence of a Uniform Horizontal Magnetic Field in a Squar with Heat Sources and Hybrid Nanofluid: Application of Partial Differential Equation	Page 63. ce Cavity ns.
Djamila BENAOUDIA. On a class of nonlocal problems arising in neutron transport theory.	Page 64.
Remissa BOUREGHIDA. On the exponential stabilization of the electromagnetoelastic system with Wentzell co	Page 64. nditions.
Hassan ZINE. Some results in terms of convergence of closed operators in different spaces.	Page 65.
Sabah Hammou BOUTHINA. Well-posedness problem for a fractional differential parabolic equation with non-local control of the second sec	Page 65. ondition.
Hellal ABDELAZIZ. Weak solutions for double phase problem with $L^{m(.)}(\Omega)$.data	Page 66.

Dounia BOUCHELIL. Well-posedness and general decay for viscoelastic wave equation with time-variying de	Page 66. elay.
Mohammed AllAll. Well-posedness and stability results for the Korteweg-de Vries equation in bounded de	Page 67. omain.
Rafa SAID . Well-posedness and stabilization of the wave equation by the boundary dissipation we tional derivative.	Page 67. vith frac-
Hamza BIBI. Static Output Stabilization of Linear Systems with Parameter Uncertainties Enhand Conditions.	Page 68. ced LMI
Fatima DIB. Variational method for delay differential equations.	Page 68.
Mesbah CHEBAB. Stability of an oscillated solutions for a delayed Nicholson Blowflie's equation with n Stepanov pseudo almost periodic harvesting term.	Page 69. nonlinear
Faiza ZAAMOUNE. A New Multi-spiral Hyperchaotic system Generating by Transformation without Equ points with Hidden and Coexisting Attractors.	Page 69. iilibrium
Meryem MEDDAHI . A hybrid method for variational inequalities over fixed point sets of multimaps.	Page 70.
Nouri NAIMA. Inverse problem of a dynamic system.	Page 70.
Lamia CHOUCHANE. A Novel Fractional-Order Chaotic Memristive System and its Analysis.	Page 71.
Soumia BELARBI. A P-Laplacian Fractional Multi Point Boundary Value Problem: Existence Of Soluti Positive Solutions.	Page 71. ons And
Sofiane ALOUANE. Backstepping control based on first-order sliding mode extended state observer for n systems with uncertainties.	Page 72. nonlinear
Chabane BEDJGUELEL. Bifurcation analysis and dynamical systems.	Page 72.
Rachid BENZAID. Boundary stabilization for a coupled system of wave equations under fractional damp	Page 73. ing.
Karima DIB. Characterization of weak invariance with respect to differential inclusions with time-demaximal monotone operators.	Page 73. ependent
Chahrazed MESSIKH . Decay result of the Timoshenko system with a fractional memory operator.	Page 74.
Mansour MOUCHIRA . Degenerate sweeping process with an integral perturbation.	Page 74.
Mohamed ALIANE. Direct method for solve fractional linear optimal control problems.	Page 75.

Zineb KHALILI . Existence and stability results for laminated beam with Thermo-Visco-Elastic effect as varing delay term	Page 75. nd a time	
Amira MAKHLOUF. Existence theorem for differential inclusions involving time and stat dependent maxim tone operators with an integral perturbation added to an unbounded set-valued pert	Page 76. al mono- urbation.	
Ibrahim DAAMECH. Exponential stabilization of the full von Kármán beam by a thermal effect and di delay	Page 76. stributed	
Daya OUIDJA. Finding the optimal control of min-max linear systems with bounded constraints.	Page 77.	
Cherifa BENNANI. LMI conditions for observer-based stabilization of linear discrete time systems with pa uncertainties.	Page 77. arameters	
Bahia HADJ ALI. Modulating function-based fast convergent observer for the Coupled Tanks system.	Page 78.	
Souheyla ZELMAT. Solving a PDE-constrained optimization problem and control constraints using the no Newton method.	Page 78.	
Dalila SADALI. Null Controllability of a coupled parabolic-elliptic system in the presence of singular	Page 79. ities.	
Fariza REZKI. Observer Design for Discrete-Time Nonlinear Systems by Using A State Augmenta proach	Page 79. ation Ap-	
Abdelmouhcene SENGOUGA. On the energy behavior of strings with time-varying length and boundary damping.	Page 80.	
Adebayo Adeniran. Optimal control of Cocoa Black pod disease: A multipronged approach.	Page 80.	
Ahcene HAMOUDI. Proportional-Integral-Funnel Control for Mass on Car System.	Page 81.	
Noura SIDHOUMI. Ricci Soliton of Four Dimensional Damek-Ricci spaces.	Page 81.	
Abdelhamid BENSALEM. Second-Order Integro-Differential Equation: Existence and Controllability Results.	Page 82.	

Online Presentation

Page 83.

Zineb KHALILI. Existence and stability results for laminated beam with Thermo-Visco-Elastic effect an	Page 83.
varing delay term.	
Ali Kessouri. Over Mahonian numbers and log-concavity.	Page 84.
Mansour BELARBI. Biharmonic curves in the 4-dimensional geometry.	Page 84.
Omar ABDELHAK. Solving Outer-Independent Double Roman Domination Problems.	Page 85.
Sara BENATMANE . A New Cryptosystem using Zero Knowledge Proofs.	Page 85.
Mohammed ELAROUSSI. Splitting Argumentation Frameworks Based on Monophonic Convexity in Graphs.	Page 86.
Aldjia IBEGHOUCHENE. Data Modeling using Neural Networks.	Page 86.
Toufik SAHABI. Calculation of Weibull parameters and function density simulation in region of Saida, (A	Page 87. Algeria).
Asma BOUMESBAH. Multiobjective Traveling Salesman Problem: An exact Approach.	Page 87.
Khelifa BERKANE. Fractional Stochastic Differential Equation Model for Disease Dynamics.	Page 88.
Taous DOUALI. Evaluation of Lax-Friedrichs and MacCormack Numerical Schemes in Dam Break Sin Using Saint-Venant Equations.	Page 88. mulation
Mhammed MEDIANI. Stochastic Analysis of an SEIR Model for Measles with Saturation Recovery Rate and C Uhlenbeck Process.	Page 89. Drnstein-
Abdelghani MEHDAOUI. Restricted Stirling numbers and chromatic polynomial.	Page 89.
Souhaib BOUDJELDA. Exact method for the bi-objective portfolio selection problem with risk-free asset.	Page 90.
Nassima BERNINE . Simulation of a Web services discovery and composition system.	Page 90.
Chahrazed MESSIKH . Decay result of the Timoshenko system with a fractional memory operator.	Page 91.
Sabira BEN ALIA. A Case Of Recurrence In The Absolute Difference Chains With Heavy Tailed Increme	Page 91. ents.
Walid ABDELAIDOUM. The Dimer Model: Analyzing the Connection Between Flips and Cycle transformatio	Page 92. <mark>ns</mark> .
Dib FATIMA. Variational method for delay differential equations.	Page 92.

Habib AMEUR. Pa Fractional differential equations on closed sets.	age 93.
Yousra GHEMIT. Pa Log-concavity of q-Mahonian numbers.	age 93.
Karima DIB . Pa Characterization of weak invariance with respect to differential inclusions with time-dep maximal monotone operators.	age 94. endent
Karima KIMOUCH. Pa A time varying BL process: approximation and derivative.	age 94.
Sabrin BOULEBENE. Pa Approximate method for solving the dynamic multi-objective bin packing problem.	age 95.
Isma DEBBAH. Pa Smoothing Parameter Selection For A New Regression Estimator For Non-negative Date	age 96. <mark>ta</mark> .
Faiza ZAAMOUNE. Pa A New Multi-spiral Hyperchaotic system Generating by Transformation without Equil points with Hidden and Coexisting Attractors.	age 96. librium
Rachid BENZAID. Pa Boundary stabilization for a coupled system of wave equations under fractional dampin	age 97. ng.
Amira MAKHLOUF. Pa Existence theorem for differential inclusions involving time and stat dependent maximal tone operators with an integral perturbation added to an unbounded set-valued perturb	age 97. mono- bation.
Djahida TILBI. The New Extended Rayleigh Distribution: different estimation methods and Application	age 98. ons.
Walid REMILI. Pa Scaled Laguerre collocation method for solving high-order ordinary differential equation the half-line.	age 98. ions on
Mohamed KHEMICI. Pa Recursive kernel density estimation for positive time series under η -weak dependence	age 99.
Mohammed AllAll. Pa Well-posedness and stability results for the Korteweg-de Vries equation in bounded dor	age 99. main.
Hichem ELMOSSAOUI. Pag Testing epidemic change in the mean of weakly dependent random variables.	ge 100.
Omar El Farouk CHERIF. Pag Exponential inequality and strong laws for weighted sums of widely dependent random va and application.	ge 100. ariables
Sami SLIMANI. Pag A Comparison Between Genetic Algorithm (GA) and Ant Colony Optimization Alg (ACO) for Robot Mobile Path Planning	ge 101. corithm
Fatma BERRIGHI. Pag Exponential stability in the context of mild solutions for neutral impulsive functional evo equations.	ge 101. rolution

Seif Eddine Akermi. Page 102. Predictive Modeling of Brucellosis Outbreaks in Algeria: Comparing SARIMA, NNAR, and Hybrid Models for Accurate Forecasting.

Chabane BEDJGUELEL.

Bifurcation analysis and dynamical systems.

Page 102.

Artificial Intelligence for Energy Consumption Reduction: The case of the Upper Rhine Region.

Djaffar OULD ABDESLAM

IRIMAS Institute, University of Haute Alsace (Mulhouse). FRANCE

— Abstract –

Buildings energy saving is one of the most important energy issues of our time. Buildings represent the largest energy-consuming sector in the economy as reported by the International Energy Agency (IEA) in 2013. In 2015, the JRC (Joint Research Center) of the European Commission published a study that shows that domestic and commercial buildings consume approximately 40% of the total electrical energy in Europe and more than a third of the power demand at peak times. A similar study was conducted in the United States by the U.S. Energy Information Administration's (EIA). For a good energy management and consumption reduction in a prosumer building, it's important to know in real time the different parameters of electrical signals. The nature and characteristics of these electrical signals, often related to the morphology of the signal or its frequency content, have led to the use of artificial intelligence techniques. Methods such as ADALINE or Machine Learning open new possibilities for the identification of electrical power parameters.

Two examples from European projects will be discussed (www.asimute.uha.com and www.smi.uha.fr).

Keywords and phrases Artificial Intelligence, Adaptive Filters, Energy Reduction, Self-Consumption, Building Management.

Received before September 15, 2024. Accepted October 3, 2024.

Game theory models and algorithms for trading demands.

Mourad BAIOU

Directeur de recherche, CNRS. FRANCE

— Abstract –

We introduce a new cooperative game theory model that we call production-distribution game. It models efficient sharing principles for practical collaboration in transportation. The originality of our model lies in the fact that the value/strength of a player does not only depend on the individual cost or benefit of the goods she owns but also on her market shares (customers demand). We prove that we can compute the nucleolus efficiently, in a nontrivial, interesting special case. We provide two algorithms to compute the nucleolus: a simple separation algorithm and a fast primal-dual one. We also show that our results can be used to tackle more general versions of the problem.

Keywords and phrases Game Theory, cooperative game, fast primal-dual. Received before September 15, 2024. Accepted October 3, 2024.

Combinatorial properties for classes of Appell polynomials

Hacène BELBACHIR.

USTHB, Faculty of Mathematics, RECITS Laboratory, Po.Box 32, El Alia, 16111, Bab Ezzouar, Algiers. ALGERIA.

— Abstract -

Our aim is to explicit the ordinary generating function of a class of Appell polynomials which extends the Euler and Genocchi ones. The used approach also works to determine the ordinary generating function of Bernoulli polynomials. In the sequel, we introduce the weighted generalized hyperharmonic numbers and give an expression of this class of polynomials in terms of like Stirling polynomials. We also study another unified approach to Apostol-Bernoulli and Apostol-Euler polynomials, we give some combinatorial and arithmetic properties and an extension of Raabe's Theorem.

Keywords and phrases Generating functions, Appell polynomials, Euler polynomials, Genocchi polynomials, Bernoulli polynomials, Stirling polynomials, weighted generalized hyperharmonic numbers, r-Stirling numbers, Raabe's Theorem.

Received before September 15, 2024. Accepted October 3, 2024.

Stabilisation prescrite de systèmes de dimension infinie : nouvelles perspectives de fonctions hypergéométriques. Islam BOUSSAADA

Univ, Paris-Sacley & IPSA. FRANCE.

— Abstract -

Récemment, dans le cadre de l'étude de la stabilité exponentielle des systèmes gouvernés par des équations différentielles fonctionnelles, un nouveau lien entre les fonctions hypergéométriques dégénérées et la distribution des zéros de la fonction caractéristique associée aux équations différentielles linéaires à retard a été mis en évidence. Cela a permis la caractérisation d'une propriété des systèmes à retard connue sous le nom de « la dominance induite par la multiplicité », ce qui a ouvert une nouvelle direction dans la conception de commande de faible complexité non seulement pour les systèmes à retard mais aussi pour certaines classes d'équations aux dérivées partielles en utilisant une idée de placement partiel des pôles. Dans cet exposé, après avoir rappelé quelques pré-requis, les fondements d'une méthodologie de placement de pôles seront présentés, puis des questions ouvertes seront abordées. Certaines applications telles que le contrôle actif des vibrations intervenant dans les structures flexibles et la modélisation de l'action du système nerveux central sur l'équilibre humain mettront l'accent sur les bénéfices de la stratégie de contrôle proposée. Enfin, des fonctionnalités d'un nouveau logiciel dédié appelé "P3 σ " (https://cutt.ly/p3delta) seront présentées.

Keywords and phrases 1D hyperbolic systems, frequency domain. Received before September 15, 2024. Accepted October 3, 2024.

Approximate and exact controllability criteria for linear 1-D hyperbolic systems.

Yacine CHITOUR

Joint Work with S. Fueyo, G. Mazanti and M. Sigalotti Universite paris saclay Université Paris Saclay saclay. FRANCE.

— Abstract -

This talk deals with the controllability of linear 1D hyperbolic systems. Reformulating the problem in terms of linear difference equations and based on infinite- dimensional realization theory, we obtain both necessary and sufficient conditions for the approximate and exact controllability, expressed in the frequency domain as well as an upper bound for the controllability times. The results are applied to dynamic network systems.

Keywords and phrases 1D hyperbolic systems, frequency domain. Received before September 15, 2024. Accepted October 3, 2024.

Exponential convergence towards consensus for non symmetric linear first order systems in finite infinite dimensions.

Emmanuel TRÉLAT This work is in collaboration with Laurent Boudin and Francesco Salvarani. Sorbonne Université Laboratoire Jacques-Louis Lions (LJLL) Paris. FRANCE

— Abstract -

I will first recall some results on how to achieve consensus for well known classes of systems, like the celebrated Cucker-Smale or Hegselmann-Krause models. When the systems are symmetric, convergence to consensus is classically established by proving, for instance, that the usual variance is an exponentially decreasing Lyapunov function: this is a L^2 theory". When the systems are not symmetric, no L^2 theory existed until now and convergence was proved by means of a L^{∞} theory. In this talk I will show how to develop a L^2 theory by designing an adequately weighted variance, and how to obtain the sharp rate of exponential convergence to consensus for general finite and infinite-dimensional linear first-order consensus systems. If time allows, I will show applications in which one is interested in controlling vote behaviors in an opinion model.

Keywords and phrases convergence to consensus. Received before September 15, 2024. Accepted October 3, 2024.

Stochastic Mean-Field Control problems and Applications

Brahim MEZERDI.

King Fahd University of Petroleum and Minerals University Blvd, King Fahd University of Petroleum and Minerals, Az Zahran. SAUDI ARABIA

— Abstract -

In this talk, we deal with optimal control of systems driven by mean-field stochastic differential equations. These equations are obtained as limits of interacting particle systems, as the number of particles tends to infinity. This kind of approximation result is called "propagation of chaos", which says that when the number of particles (players) tends to infinity, the equations defining the evolution of the particles could be replaced by a single equation, called the McKean-Vlasov equation. This mean-field equation, represents in some sense the average behavior of the infinite number of particles. Since the earlier papers by Lasry-Lions and Huang-Malhamé-Caines, mean-field control theory and mean-field game theory has raised a lot of interest, motivated by applications to various fields such as game theory, mathematical finance, communications networks, management of oil ressources. We will review some of the main results about mean-field games and mean-field control.

Keywords and phrases convergence to consensus. Received before September 15, 2024. Accepted October 3, 2024.

Conferences

Mixed-integer quadratic programming formulations for computing the Lipschitz constant of ReLU networks

Mohamed SBIHI.

This work is in collaboration with Nicolas Couellan and Sophie Jan. Laboratoire ENAC, Université de Toulouse. FRANCE.

— Abstract –

The Lipschitz constant of a neural network is a useful metric to get information about the robustness of a trained network. Its exact calculation is however NPhard even for one hidden layer ReLU networks. In this presentation, by taking into account activation regions at each layer as new constraints, we propose new quadratically constrained mixed-integer programming formulations for the neural network Lipschitz estimation problem. The solutions of these problems give lower bounds and/or upper bounds of the Lipschitz constant. We give some experiments to compare the proposed approach with State Of the Art algorithms to estimate the Lipschitz constant of a neural network.

Keywords and phrases Differential measures, Differential inclusions, Sweeping Process, Vector Measures, Integration of bilinear functions.

Received before September 15, 2024. Accepted October 3, 2024.

Moreau's sweeping process in separable Banach spaces

Youcef ASKOURA.

LEMMA, Université Paris-Panthéon-Assas, 4 rue Blaise Desgoffe 75006 Paris, FRANCE.

— Abstract –

We consider Moreau's sweeping processes in a general separable Banach space. We do not use, like in the existing literature, semi-scalar products or metric projections. The idea is to embed the underlying Banach. space in an Hilbert space

Keywords and phrases Differential measures, Differential inclusions, Sweeping Process, Vector Measures, Integration of bilinear functions.

Conference

Bimatrix Games under Uncertainty: A Survey.

Farida ACHEMINE and Moussa LARBANI

Ecole Nationale Supérieur de Mathématiques, Sidi Abdellah ALGER . ALGERIA

— Abstract -

Bimatrix games serve as powerful tool for modeling strategic interactions in various fields, ranging from economics to biology and beyond. However, the presence of uncertainty adds a layer of complexity to the decision-making processes within bimatrix games, influencing equilibrium solutions and strategic outcomes. This review provides a comprehensive analysis of bimatrix games under uncertainty, exploring theoretical perspectives, modeling techniques, applications, and future directions. We examine the impact of uncertainty on equilibrium concepts, solution methodologies, and decision-making strategies within bimatrix games. Furthermore, we discuss some potential directions of research.

Keywords and phrases Bimatrix game under uncertainty; random variables; Fuzzy random variables; Fuzzy numbers; Rough set; Liu's Uncertanty.

Received before September 15, 2024. Accepted October 3, 2024.

Over (q, t)-binomial coefficients: Combinatorial properties and log-concavity

Moussa Ahmia and Yousra Ghemit

Attaché de Recherche BP 32, EL Alia, Bab Ezzouar. ALGERIA.

— Abstract –

In this paper, we define overpartition analogues of qbisnomial coefficients as generating functions for the number of overpartitions fitting inside the $(N-1) \times M$ rectangle, where no part appears more than s times. We refer to these as over q-bisnomial (or over (q, t)- bisno-

mial) coefficients. We then prove the (q, t)-logconcavity (and q-log-concavity) of these over (q, t)- bisnomial (and over q-bisnomial) coefficients. Additionally, we extend the results of Dousse and Kim on the (q, t)-logconcavity of over (q, t)-binomial coefficients

Keywords and phrases Over partitions ; Over (q;t) ; bi^snomial coefficients ; Path/Partition ; Tiling ; Log ; concavity

Conferences

Mathematical modelling for the dynamic of COVID-19 epidemic in discrete time

Amar Debbouche

Department of Mathematics, Guelma University, Guelma 24000. ALGERIA.

— Abstract –

In this work, we consider a discrete-time variable-order SEIQR model incorporated for COVID-19. First, we show the well-possedness result. Then, the disease-free and the endemic equilibrium points are determined. Moreover, we establish the local asymptotic stability of the model. Further, we introduce an optimal control problem involved with variable-order discrete COVID-19 model. Finally, we support our obtained results with numerical simulations.

Keywords and phrases COVID-19 model, Variable-order discrete calculus, optimal control, stability, numerical simulation.

Received before September 15, 2024. Accepted October 3, 2024.

On the energy behavior of strings with time-varying length and boundary damping

Abdelmouhcene Sengouga and Seyf Eddine Ghenimi

Laboratory of Functional Analysis and Geometry of Spaces. University of M'Sila. ALGERIA.

— Abstract -

We investigate the behavior of a damped string undergoing small vibrations, where the string's length changes over time. The system is described by a wave equation within a time-dependent interval $(0, \ell(t))$, with the string's endpoint moving at a velocity that satisfies $|\ell'(t)| < 1$. Our analysis yields an exact solution using a series representation, which enables us to establish both upper and lower bounds for the string's energy. These bounds are characterized by explicit constants that depend on the damping factor and $\ell(t)$.

Keywords and phrases Wave equation, time-dependent domains, generalized Fourier series, boundary stabilization.

A time varying BL process: approximation and derivative

Karima Kimouch

Department of Mathematics, 20 august 1955 university skikda SKIKDA - ALGERIA.

— Abstract -

In this paper, we attempt to shed light on the timevarying bilinear process. So, the class of bilinear models is generalized to the nonstationary class of bilinear models with time-varying coefficients, and it is shown that this latter can locally be approximated by stationary bilinear process. The measure of deviation from stationarity can be expressed as a function of a derivative bilinear process. This derivative bilinear process inherits many properties common to stationary bilinear processes. Moreover, a Taylor expansion of the nonstationary bilinear process in terms of stationary processes is given and it is shown that the derivative processes obtained here satisfy alpha mixing properties.

Keywords and phrases Time varying BL process ; Locally stationary process ; derivative process Received before September 15, 2024. Accepted October 3, 2024.

Estimation of density and hazard rate functions in the case of three families of asymmetric kernels

_____***_____

Massilva Bourouina, Aicha Bareche, Yasmina Ziane

Unité de recherche Laboratoire de Modélisation et Optimisation des Systèmes [Université de Béjaïa] BEJAIA - ALGERIA.

— Abstract -

The aim of this paper is to conduct comparisons between nonparametric kernel estimators of a density function f and a hazard rate function λ , based on various families of asymmetric kernels: GBS, GG, and

LS. Both a simulation study and an application to realworld data are carried out to evaluate the performance of the estimators.

Keywords and phrases Density function ; hazard rate function ; GBS kernel family ; GG kernel family ; LS kernel family

TOPIC : Probability \mathcal{B} **Statistics**

An extension of statistical preference to fuzzy random variables using possibility and necessity.

Aiche Farid

DEPT of Mathematics UNIV TIZI OUZOU UNIV TIZI OUZOU - ALGERIA.

— Abstract -

An extension of statistical preference to fuzzy random variables is presented in two steps. The first consists in extending the statistical preference of random variables to random intervals by means of interval order. The second step consists in generalizing the statistical preference of random intervals to fuzzy random variables based on works of Dubois and Prade who generalize interval order of reals intervals to fuzzy interval considred as possibility distribution.

Keywords and phrases Statistical preference ; fuzzy random variables ; interval order ; comparison of fuzzy intervals ; possibility ; necessity.

Received before September 15, 2024. Accepted October 3, 2024.

An improved kernel density estimator for univariate data

Hind Bouredji

University of mohamed khider - ALGERIA.

— Abstract –

The kernel method is one of the most popular methods in nonparametric density estimation because it's simply used in theoretical calculation, the draw back of this method that is the estimator is biased and is not consistent when the data near the end points of the support, due to so-called boundary effects that occur in nonparametric curve estimation problems. In the literature, to remove the problem of kernel density estimation at the left boundary points, a variety of solutions have been proposed. In this study, we proposed a new approach reducing the bias of the kernel density estimator near the right bord of the support [0, 1].

Keywords and phrases Nonparametric density estimation ; Boundary problems ; Boundary correction ; Transformation and reflection methods.

Analysis of a single server queue in a multi-phase random environment with working vacations and customers' impatience.

Meriem Houalef

University center of Maghnia Tlemcen 13000 - ALGERIA.

— Abstract -

In this work, we analyze an M/M/1 queueing system under both single and multiple working vacation policies, multi- phase random environment, waiting server, balking and reneging. When the system is in operative phase j = 1, 2, ..., K, customers are served one by one. Whenever the system becomes empty, the server waits a random amount of time before taking a vacation, causing the system to move to working

vacation phase 0 at which new arrivals are served at a lower rate. Using the probability generating function method, we obtain the distribution for the steady-state probabilities of the system. Then, we derive important performance measures of the queueing system. Finally, some numerical examples are illustrated to show the impact of system parameters on performance measures of the queueing system.

Keywords and phrases Queueing models. Random environment. working vacation policy. impatient customers. Probability generating function. Optimization.

Received before September 15, 2024. Accepted October 3, 2024.

The SPC approach : Application of statistical indicators.

***_

<u>BENRABAH Mohamed Elamine</u>, Ouahab KADRI Ouahab, MOUSS Kinza Nadia, BENHASSINE Naâmane

LAP-Batna, University of Batna 2. BATNA - ALGERIA.

— Abstract -

Statistical process control is a major asset used to avoid interchangeability problems in manufacturing assembly. In this article, we discuss an important tool of this approach called the statistical indicator. We applied it to the data collected by the company's quality control agents to perform a diagnosis of this process in order to detect the cause of assembly defects affecting the final product.

Keywords and phrases Control charts ; Interchangeability ; Manufacturing control ; Mechanical assembly ; Process diagnosis.

$\textbf{TOPIC}: \textbf{Probability} ~ \boldsymbol{\varnothing} ~ \textbf{Statistics}$

Bayesian Loss Robustness of Exponential Models.

Lyasmine HARROUCHE, Hocine FALLAG, Lynda ATIL

Laboratory of Pure and Applied Mathematics. Mouloud Mammeri University of Tizi-Ouzou - ALGERIA.

— Abstract –

Bayesian loss robustness of estimators for exponential samples is considered. The posterior expected loss variations are studied under general class of LINEX functions. To study the robustness, the ranges of the posterior expected loss of the Bayesian estimator is calculated. Using the range of posterior expected loss under class of LINEX functions, the robustness of the Bayesian estimator for exponential samples is studied.

Keywords and phrases Bayesian robustness ; Exponential sample ; LINEX loss function ; Posterior loss ; robustness ; Prior distribution.

Received before September 15, 2024. Accepted October 3, 2024.

Beta-Polynomial Exponential Model: Properties and Applications

Mohamed Kouadria, Zeghdoudi Halim

Université Badji Mokhtar Annaba - Algeria.

— Abstract –

In this study, we propose the beta-polynomial exponential model that extends the Polynomial Exponential distribution. while taking into account the transformedtransformer T-X generated family of distributions, and look into mathematical properties such as the moment generating function, the rth moment, the entropy, the stress-strength reliability and order statistic. The unknown parameters of the Beta-Polynomial Exponential Model are estimated. Finally, real dataset application of the Marburg virus for demonstrate how our model is fits better than the other clasical models.

Keywords and phrases Maximum likelihood estimator; Polynomial Exponential Distribution; Beta distribution; Incomplete moments

TOPIC : Probability \mathcal{E} Statistics

Comparison of Discordance Tests and Outlier Filtering Methods based on David and Paulson's Performance Measures

Kamilia HADDADOU, Lynda ATIL, Hocine FELLAG

Laboratory of Pure and Applied Mathematics. Mouloud Mammeri University of Tizi-Ouzou - ALGERIA.

— Abstract -

The detection of outliers is essential for ensuring the integrity and accuracy of data analyses. This study highlights the importance of measuring the performance of outlier detection methods and tests using robust criteria and performance measures. By applying the criteria of David and Paulson, we evaluate several discordance tests as well as popular outlier detection methods. We introduce five performance measures $(P_1, P_2,$

 P_3 , P_4 , P_5) to compare the efficiency of each method. Additionally, our novel contribution includes the use of the measure P_2 to specifically evaluate outlier filtering methods. The results of this study provide valuable insights for selecting the most reliable and effective techniques in various analytical contexts, thereby ensuring robust and precise data analyses.

Keywords and phrases Discordance Tests; Outlier Filtering Methods; Performance Measures; outlier detection; normal sample

Received before September 15, 2024. Accepted October 3, 2024.

Consistency of a geometric-type estimator for tail index under weak dependence

Karima Boualam

Laboratoire de Mathématiques Pures et Appliquées [Tizi-Ouzou] Université Mouloud Mammeri de Tizi-Ouzou - Algeria.

— Abstract –

The aim of this paper is the estimation of the tail index parameter β under weak dependence in the sense of Doukhan [5]. This notion of weak dependence is more general than the classical frameworks of mixing. In the situation of mixing, the consistency of the geometrictype estimator was investigated by Brito and Freitas [3]. Here relaxing this requirement by a weak dependence assumption and we provide an application of this result for infinite moving average with heavy tail innovations.

Keywords and phrases Tail index ; order statistics ; regularly varying function ; linear process ; weak dependence Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Probability \mathscr{E} **Statistics**

Exponential inequality and strong laws for weighted sums of widely dependent random variables and application

Omar El Farouk Cherifi, Samir Benaissa, Boubaker Mechab

statistics and stochastic processes laboratory, Djillali Liabes University of Sidi Bel Abbes BP89- ALGERIA.

— Abstract –

In this paper, we determine an exponential inequality for weighted sums of non-identically distributed widely dependent random variables, as well as establish the strong law of large numbers under the same conditions. As an application, we prove the strong consistency of the nonparametric regression model.

Keywords and phrases Widely dependence ; exponential inequality ; strong law of large numbers ; nonparametric regression model

Received before September 15, 2024. Accepted October 3, 2024.

_* * * _

Infinite and Finite Step Relations Between the Prediction Coefficients

Houria BOUZIANE, HAMAZ Abdelghani

Université Mouloud Mammeri de Tizi-Ouzou - ALGERIA.

— Abstract -

In this paper, we investigate the problem of linear prediction of stationary random fields with nonsymmetrical half-plane past. We aim at finding an explicit formula of the mean square convergent autoregressive series representation for all (h_1, h_2) -step ahead linear predictors, $(h_1, h_2) \ge (0, 0)$. In order to calculate expli-

citly the prediction coefficients of our new expression, we provide recursive relations between the finite multistep prediction coefficients which are a generalization of the relations between the prediction coefficients of infinite multi-step ahead linear predictors presented in ([3]).

Keywords and phrases Stationary random fields ; moving average representation ; autoregressive representation ; linear prediction ; mean square convergence.

_* * * _

Information Criterion for Stationary Processes in Z2

Djaballah Khedidja

Laboratoire MSTD, Faculté de Mathématique, USTHB - ALGERIA.

— Abstract –

We study the spatial processes $(X_t, t \in T)$, based on the fact that the index t varies in a set T without a natural structure of order. To identify the model, we minimize the final predicted error, and we minimizes Akaike information criterion. Simulation experiments and an application to real data are carried out.

Keywords and phrases Model selection ; spatial models ; information criteria. Received before September 15, 2024. Accepted October 3, 2024.

Intercept-only Model under Non-normality

Asma Bouchafaa

Laboratoire MSTD, Faculté de Mathématique, USTHB - ALGERIA.

— Abstract -

Most regression methods rely on assumptions about the conditional distribution of the dependent variable given the explanatory variables. Assuming normality of the error variables can simplify the estimator considerably. In this thesis, we propose a linear regression model with an intercept, assuming non-normal errors. We consider the case where the errors follow an exponential distribution. The maximum likelihood estimate of the parameter in the model is developed under this hypothesis. We describe the theoretical properties of the proposed estimator, including its limit distribution. Furthermore, we estimate the regression parameter using the standard least squares method for comparison.

Keywords and phrases Estimation ; convergence ; intercept ; regression model Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Probability \mathscr{E} Statistics

Jump-Diffusion Parameters and Passage Times Estimation

Samia Meddahi, KHALED KHALDI

Department of Mathematics, Faculty of Sciences, M'hamed Bougara University of Boumerdes - ALGERIA.

— Abstract -

The main purposes of this paper are two contributions: (1) it presents a method, which is the first passage time generalized for all passage times (GPT method), in order to estimate the parameters of stochastic Jump-Diffusion process. (2) it compares in a time series model, share price of gold, the empirical results of the estimation and forecasts obtained with the GPT method and those obtained by the moments method and the FPT method applied to the Merton Jump-Diffusion (MJD) model.

Keywords and phrases Merton Jump ; Diffusion ; First passage time ; Black ; Scholes equation ; Trajectory. Received before September 15, 2024. Accepted October 3, 2024.

kernel estimator of relative error regression function for twice censored and dependent data

Ouardia Sabrina Benzamouche

Laboratoire MSTD, Faculté de Mathématiques, USTHB, BP 32, El-Alia 16111 - ALGERIA.

— Abstract -

Let $(Y_i)_{1 \leq i \leq n}$ be a sequence of dependent random variables (r.v.) of interest distributed as Y and $(X_i)_{1 \leq i \leq n}$ be a corresponding *d*-dimensional vector of covariates taking values on \mathbb{R}^d . The r.v. Y is twice censored and satisfies the α -mixing property. In this paper, we are interested in the relative error regression estimation in case of twice censored data under strong mixing condition. Under suitable assumptions, the estimator's strong uniform almost sure consistency with rate and

the asymptotic normality are established. We have highlighted the covariance term, which is relatively uncommon in this context. Furthermore, we give a result about the α -mixing rate in the case for twice censoring. As far as we know there is no analogous result with proof in the context of twice censoring. A simulation study is conducted in both, one and two dimensions for the covariate to highlight the performance of our estimator.

Keywords and phrases Kernel estimate ; Patilea ; Rolin estimator ; relative regression error ; strong mixing condition ; twice ; censored data ; uniform almost sure consistencyReceived before September 15, 2024. Accepted October 3, 2024.

Machine Learning for Estimating Volatility

Baya Takhedmit

Unit of Research LaMOS, University of Bejaia - ALGERIA.

— Abstract -

Numerical analysis investigates the influence of input parameter variations on the results of computational models. This study centers on evaluating the price of a European call option, with a particular focus on identifying the input parameters that introduce the most significant uncertainty. Using the Black-Scholes-Merton model as our framework, we analyze how uncertainties in the risk-free interest rate and volatility affect the accuracy of the model's predictions. Our objective is to develop a more precise understanding of the impact these uncertain parameters have on the model's outcomes, thereby enhancing the reliability of option pricing.

Keywords and phrases Call option model ; Machine Learning ; Volatility. Received before September 15, 2024. Accepted October 3, 2024.

Modeling Interaction Point Processes Based on Minimum Distance

Ahmed Ait Ameur, Hichem Elmossaoui, Nadia Oukid

LAMDA-RO Laboratory, Department of Mathematics, Faculty of Sciences, University Saad Dahlab Blida1, BP 270 Soumâa, Blida - ALGERIA.

— Abstract -

We introduce a new family of Markov point processes, offering increased flexibility in generating spatial patterns. This model stands out for its ability to model a variety of clustered, random, and ordered patterns based on scalar parameters. Unlike traditional pairwise interaction models, our approach includes interaction terms of all orders. The probability density of the model is defined in terms of the closest distance between points, which avoids the limitations of models based on fixed radii. The article also explores a simulation technique for this model, as well as its application in studying the spatial distribution of points.

Keywords and phrases Point processes ; Markov point processes ; Pairwise interaction processes ; Traveling Salesman Problem ; Markov Chain Monte Carlo (MCMC) simulation algorithms. Received before September 15, 2024. Accepted October 3, 2024.

Numerical solution of Markov renewal equations in continuous time semi Markov process

Chafiâa Ayhar

LMSSA. Nour El bachir Center University of El bayadh - ALGERIA.

— Abstract –

For a given homogeneous semi-Markov process (SMP) with piecewise continuous semi-Markov kernel, the transition and the probability functions are obtained by Markov renewal equations. By using solved numeric-

ally this system of integral equations, we present some simulations of transition probability approximation of continuous-time semi-Markov processes.

Keywords and phrases Semi Markov process; Numerical method; integral equations; Algorithms. Received before September 15, 2024. Accepted October 3, 2024.

On an analytical method for forcasting the coefficients of an AR(p)

Farida Slimi, Faroudja AUMORASSI

Mouloud MAMMERI University of Tizi-ouzou - ALGERIA.

— Abstract -

In this talk we are interested by the inversion of any stationary and causal autoregressive process of order p, we give some recurrence relations satisfied by the coefficients of an infinite moving average process rep-

resentation in the sense of Wold decomposition. We calculate the explicit formula of these coefficients and the corresponding auto-covariance function.

Keywords and phrases Generating functions ; time series ; autocovariance function Received before September 15, 2024. Accepted October 3, 2024.

On numbers behind finite autoregressive process

Faroudja AUMORASSI, Farida Slimi

University Mouloud MAMMERI of TiziOuzou - ALGERIA.

— Abstract -

This work is devoted to the inversion of any stationary and causal autoregressive process of order p namely AR(p) by using geometric series and generating functions to introduce a new approach for computing explicitly the inverse of the operator $\varphi_p(L)$ in order to construct the moving average representation of an AR(p). We give several recurrence relations satisfied by the coefficients of the infinite moving average process representation $MA(\infty)$, explicit formula of these coefficients and the corresponding auto-covariance function (ACFV) by means just the coefficients of the Lag operator, by assuming that the roots of the operator $\varphi_p(L)$ are out side the unity circle.

 $\label{eq:keywords} \begin{array}{l} \textbf{Keywords and phrases} \ \mbox{Autoregressive process} \ ; \ \mbox{back shift operator} \ ; \ \mbox{moving average representation} \ ; \ \mbox{generating function} \ ; \ \mbox{autocorrelation function}. \end{array}$

Received before September 15, 2024. Accepted October 3, 2024.

Nonparametric estimation of the trend for stochastic differential equations driven by generalized mixed fractional Brownian motion

Amina Becheroul, Mohamed Cherfi

Université Hassiba Ben Bouali de Chlef - ALGERIA.

— Abstract -

In the present work, we consider the problem of estimating the trend function for a process that satisfies stochastic differential equations driven by a generalized mixed fractional Brownian motion. We propose a Kernel estimator based on continuous observation and then study its asymptotic properties.

 ${\sf Keywords}$ and ${\sf phrases}$ Generalized mixed fractional Brownian motion ; non parametric estimation ; kernel estimator ; trend function
Recursive kernel density estimation for positive time series under η -weak dependence

Mohamed Khemici, Nabil Zougab, Smail ADJABI

LaMOS Research Unit. Abderrahmane Mira University of Bejaia - ALGERIA.

— Abstract -

This paper investigates recursive kernel density estimation for positive time series under η -weak dependence. The mean integrated squared error (MISE) is es- tablished as a global property. A simulation study investigates the performance of some asymmetric kernel (G, IG and RIG) recursive kernel density estimators and compares their performance with the non-recursive density estimators for η -weak dependence.

Keywords and phrases Mean integrated squared error, Recursiv kernel density estimation, η weak dependence, Time series.

Received before September 15, 2024. Accepted October 3, 2024.

Ruin probability stability bounds in insurance using a semiparametric method

Aicha Bareche, Zineb HARFOUCHE

Unité de recherche Laboratoire de Modélisation et Optimisation des Systèmes [Université de Béjaïa] Rue Targa Ouzemour, Bejaia - ALGERIA.

— Abstract –

The aim of this paper is to propose a semi-parametric density estimation approach for the improvement of the quality of the stability bound on the probability of ruin in a classical risk model with large claims using the strong stability method. We use two approximation techniques to obtain ruin stability bounds (the Markov chain (MC) method and the regenerative process approach (RP)). To evaluate the performance and effectiveness of our proposed approach, we provide an application based on insurance real data. A comparative study between semi-parametric and nonparametric kernel method as well as a comparison between both stability bounds based on MC and PR approaches are performed.

Keywords and phrases Stability bound ; ruin probability ; Markov chain ; regenerative process ; semi ; parametric estimation.

Semiparametric von Mises kernel circular density estimator

Kahina BEDOUHENE, Yasmina ZIANE, Nabil ZOUGAB, Smail ADJABI

Université mouloud Mammeri Tizi ouzou - Algeria.

— Abstract –

The aim of this article is threefold. First, we propose the semi-parametric circular kernel estimator, as well as its statistical properties. Secondly, we construct a new semi-parametric circular kernel estimator, using the JSH technique of [8] in order to accelerate the convergence of the bias. Statistical properties of this new estimator will also be studied. As a third objective, an application on simulated data and real data will be carried out to compare the performance of the developed estimators.

Keywords and phrases Bandwidth ; Bayesian approach ; Circular density ; Cross validation ; MBC techniques ; Markov chain Monte Carlo (MCMC) ; von Mises kernel

Received before September 15, 2024. Accepted October 3, 2024.

Smoothing Parameter Selection For A New Regression Estimator For Non-negative Data

Isma DEBBAH, Naâmane Laïb, Abdelkader Tatachak

Faculty of Mathematics, USTHB, Laboratory MSTD, BP 32, El-Alia, 16111 - ALGERIA.

— Abstract –

In this paper, we apply the CV selection technique to the estimator proposed by Chaubey, Laib, and Sen (2010), which is a new regression estimator for nonnegative random variables. The estimator is based on a generalization of Hille's lemma and a perturbation idea. A simulation study is conducted to compare the performance of the proposed approach with other competitive methods.

Keywords and phrases Gamma kernels; Non-negative data; Regression function ; Hille's lemma. Received before September 15, 2024. Accepted October 3, 2024.

Stochastic Analysis of an SEIR Model for Measles with Saturation Recovery Rate and Ornstein-Uhlenbeck Process

Mhammed Mediani, Abdeldjalil Slama, Ahmed Boudaoui, Abdeldjalil Kadri

Laboratory of Mathematics, Modeling and Applications (LaMMA), University of Adrar, Adrar University of Adrar, Adrar - ALGERIA.

— Abstract -

In our study, we formulated a stochastic model to represent the complex transmission dynamics of measles. We began by proving the existence and uniqueness of a global positive solution for the stochastic system. Using the Lyapunov function method, we demonstrated the existence of a stationary distribution for the positive solution, provided the stochastic reproduction number $R_0^s > 1$. This result is crucial as it suggests the potential persistence of the disease in a biological setting. Additionally, we derived sufficient conditions for the extinction of the disease. To reinforce our theoretical results, we performed numerical simulations, which helped to confirm the analytical outcomes and explore the effects of stochastic fluctuations on disease transmission

Keywords and phrases Measles model; Ornstein–Uhlenbeck process; Stationary distribution; Extinction Received before September 15, 2024. Accepted October 3, 2024.

A Case Of Recurrence In The Absolute Difference Chains With Heavy Tailed Increments.

Fetima Ladjimi

In memory of **Mohand Arezki Boudiba and Baya Bessad** LMPA, Mouloud Mammeri university of Tizi-Ouzou. Tizi- Ouzou. ALGERIA.

— Abstract –

The Markov chain defined by $X_n = |X_{n-1} - Y_n|$, where $(Y_n)_{n \ge 1}$ is a sequence of i.i.d. random variables taking values in the non-negative real numbers, admits a unique stationary measure if the distribution function F of Y_n is absolutely continuous with respect to the Lebesgue measure. If this distribution has an infinite

mean, the stationary measure is unbounded. In the case where the distribution is regularly varying and non-arithmetic, with an index $-\alpha$, where $\frac{1}{2} < \alpha < 1$ the recurrence of the Markov chain is established using an approximation of the renewal function and martingale techniques.

Keywords and phrases Markov Chain; Iterated Random Functions; Recurrence; Heavy Tailed distributions. Received before September 15, 2024. Accepted October 3, 2024.

Structure and inference in high-order self-excited multiple thresholds GINAR models

Mohamed Djemaa SADOUN.

RECITS Laboratory, Research Center in Applied Economics for Development (CREAD), ALGERIA. Operational Research Department, University of Sciences and Technology Houari Boumediene (USTHB), ALGERIA.

— Abstract –

We propose a threshold integer-valued autoregressive model, with multiple regimes $(K \ge 2)$, based on generalized thinning operator (hereafter referred to as SET-GINAR (K;p)). First, we study the probabilistic structure of our model through the stationarity issue and moments structure. Second, we provide three statistical inference procedures, namely: two estimation methods, as well as a nonlinearity test procedure to test the threshold effect. Finally, the performances of the obtained inference procedures will be evaluated via an intensive simulation study and application on real data.

Keywords and phrases Count integer ; valued process ; SET-GINAR(K ; p) model ; CLS and CML estimators ; nonlinearity time series.

Received before September 15, 2024. Accepted October 3, 2024.

Testing epidemic change in autoregressive process with dependent innovations

Dalila MERABET

Mouloud Mammeri University of Tizi-Ouzou- ALGERIA.

— Abstract —

In this paper, we consider a first order autoregressive process. Our aim is to test epidemic change in the mean of innovations under dependence (α -mixing). We use the classical methodology to build the test statistics based on the observations, that is using continuous functionals of partial sums process. We consider two Hölderian test statistics, uniform and dyadic increments statistics.

Keywords and phrases Autoregressive process ; epidemic change ; Hölder space ; partial sums processes. Received before September 15, 2024. Accepted October 3, 2024.

Using Marked Point Processes for Computer Experiment Design.

Hichem Elmossaoui, OUKID Nadia, Aitameur Ahmed

LAMDA-RO Laboratory, Department of Mathematics, Faculty of Sciences, University Saad Dahlab Blida1, BP 270 Soumâa, Blida - ALGERIA.

— Abstract –

This article presents a method for construction computer experiment designs based on stochastic process theory, specifically marked point processes with kmarks. The designs are generated using the Monte Carlo method through Markov Chains (MCMC) and the Metropolis-Hastings algorithm. This approach allows for great flexibility, making the designs adaptable to various objectives. Additionally, an in-depth analysis of the convergence of the Markov chains has been conducted.

Keywords and phrases Experimental designs ; Computer experiment designs ; Point processes ; Markov Chain Monte Carlo (MCMC) ; Metropolis ; Hastings algorithm. Received before September 15, 2024. Accepted October 3, 2024.

The Markov-switching periodic INARCH(q) process: Theory and application to unemployment data

Billel ALIAT

BP 32 Bab Ezzouar, 16111 - ALGER- ALGERIA.

— Abstract —

This work focuses on count time series with nonnegative integer values. We deal with an integer-valued time series model that we called the Markov-switching periodic integer-valued ARCH model (MS-PINARCH). This new model that we propose accounts for structural changes that occur in the dynamics of this kind of series as well as the heteroskedasticity that is frequently observed in many integer-valued time series and the hidden periodicity in the autocovariance structure. This work's primary objective is to present some of the probabilistic characteristics of the proposed model, such as the periodic first- and second-order stationarity conditions. Furthermore, the estimation of the model parameters is tackled using the Hamilton filter, and a simulation study is used to demonstrate its performance. Finally, we applied the proposed model in modeling the series of the number of unemployed in the United States of America.

Keywords and phrases Periodicity ; Integer valued time series ; Markov Switching models ; Periodic stationarity ; Hamilton Filter ; Simulation study ; Unemployment

Information Criterion for Stationary Processes in Z2.

Djaballah Khedidja

Laboratoire MSTD, Faculté de Mathématique, USTHB. ALGERIA.

— Abstract –

We study the spatial processes $(X_t, t \in T)$, based on the fact that the index t varies in a set T without a natural structure of order. To identify the model, we

minimize the final predicted error, and we minimizes Akaike information criterion. Simulation experiments and an application to real data are carried out.

Keywords and phrases Model selection ; spatial models ; information criteria. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Probability \mathscr{E} **Statistics**

The New Extended Rayleigh Distribution: different estimation methods and Applications

Djahida Tilbi

University 20 August 1955 Skikda - ALGERIA.

— Abstract -

The New Extended Rayleigh Distribution (*NERD*) is an advanced statistical model designed to extend the classic Rayleigh distribution. It incorporates additional parameters to better capture the variety and characteristics of complex data sets. In this work, we propose various estimation methods: maximum like-

lihood estimation, weighted least squares, percentile and maximum product of spacing. Simulation results demonstrate that the NERD model provides a better fit to the data compared to several competing distributions.

Keywords and phrases Maximum likelihood estimation ; method of weighted least squares ; method of percentile ; method of maximum product of spacing.

Received before September 15, 2024. Accepted October 3, 2024.

A Buffered transition approach for Nonlinear Stochastic Volatility Modeling.

<u>Abderaouf Khalfi</u>, Nadia Boussaha, Fayçal HAMDI RECITS Laboratory, Faculty of Mathematics, USTHB, ALGERIA.

— Abstract –

This work introduces a novel threshold model to address the asymmetry and leverage effect in the volatility of financial time series. Our model extends the traditional threshold stochastic volatility model by incorporating a flexible, smooth regime-switching mechanism that eliminates the abrupt jumps in log-volatility associated with the classical approach. This innovation leads to the Buffered Threshold Stochastic Volatility (BT SV) model. Following model definition, we establish a sufficient condition for strict stationarity and develop a Sequential Monte Carlo method for parameter estimation. To assess the effectiveness of our proposed methodology, we conduct a comprehensive simulation study. Finally, we apply the BT SV model to the Honeywell International Inc index, demonstrating its competitive performance in modeling asymmetry in financial returns analysis.

Keywords and phrases SONATRACH; Stock management; ABC-XYZ analysis; Safety stock; Stockout; Instrumentation; Item availability.

A hybrid method for variational inequalities over fixed point sets of multimaps

Meddahi Meryem

Faculty of Technology. University of Hassiba Benbouali. ALGERIA.

— Abstract –

The purpose of this paper is to introduce an iterative scheme based on the viscosity approximation method for finding a solution of variational inequality problems over the fixed points set of demicontractive multimaps. Then, we prove the strong convergence of the iterative scheme to find a unique solution of the variational inequality. We provide an application to convex minimization over fixed point sets of multimaps.

Keywords and phrases Conjugate method ; convex minimization ; demicontractive multimap ; fixed point ; variational inequality.

Received before September 15, 2024. Accepted October 3, 2024.

Hybrid Evolutionary Metaheuristic Approach to the Constrained Multiobjective Portfolio Optimization Problem.

MASSIKA IKHLEF, MEZIANE AIDER.

ENSSEA KOLEA, ALGERIA.

— Abstract —

In this paper, we propose a multi-objective evolutionary metaheuristic approach based on the Pareto Ant Colony Optimization (P-ACO) metaheuristic and the non-dominated genetic sorting algorithms (NSGA II and NSGA III) to solve a bi-objective portfolio optimization problem. P-ACO is used to select the best assets that compose the efficient portfolio. Then, NSGA II and NSGA III are separately used to find the proportional weights of the budget allocated to the selected portfolio.

Keywords and phrases Multiobjective optimization ; Portfolio selection ; Pareto Ant Colony Optimization ; Non-Dominated Sorting Genetic Algorithm.

An algorithm for continuous global optimization by dimensionality reduction

Raouf Ziadi

Departement of Mathematics, University Ferhat Abbas Setif, ALGERIA.

— Abstract –

In this paper, we present an algorithm for solving bound-constrained global optimisation problems where the objective function is only continuous. In the proposed algorithm we transform the initial multidimensional problem into a one-dimensional one of the same type by running a space filling curve, which becomes increasingly denser and progressively fills the feasible domain. Throughout the generated curve, a one-dimensional global optimization algorithm scans the search space to obtain the global minimum. To accelerate the corresponding algorithm, we have incorporated a derivative free local search algorithm to explore promising regions. The proposed algorithm converges in a finite number of iterations to the global minimum within a prescribed accuracy. Numerical experiments are achieved on some typical test problems and a comparison with well known methods is carried out to show the performance of our algorithm.

Keywords and phrases Global optimization ; Reducing transformation method ; Evtushenko's algorithm ; Generalized Pattern Search algorithm ; Lissajous parametrized curve.

Received before September 15, 2024. Accepted October 3, 2024.

An Efficiency Test for Solutions to the Problem of Optimizing a Function over the Non-Dominated Set

Zerfa Lamia, Mohamed El-Amine Chergui.

University of Algiers 1, Benyoucef Benkhedda, ALGERIA.

— Abstract -

In this paper, we focus on the optimization of a function Ψ over the efficient set of a multi-objective optimization problem. We introduce a new efficiency test that integrates Benson's test with Ψ , utilizing an auxiliary optimization program. This program not only identifies an efficient solution but also establishes a lower bound for Ψ . Furthermore, the solution is shown to be optimal for Ψ when compared to other alternatives in the multi-objective integer programming (MOIP) problem. We then propose an algorithm to solve the optimization of a function over the non-dominated set. Finally, the effectiveness of the algorithm is demonstrated through a performance comparison with existing approaches on well-known problem instances from the literature.

Keywords and phrases branch and bound ; non-dominated point ; multi-objective integer programming ; optimization over the efficient set ; Benson's method.

Convex lower bound function for univariate non-convex functions.

Djamel Zerrouki, Ouanes Mohand.

Department of Mathematics Faculty of Sciences, UMMTO University, Laboratory of Operational Research and Mathematics (LAROMAD), ALGERIA.

— Abstract –

In this work, we propose a convex lower bound function for univariate nonconvex functions. The new lower bound function is based on a concave relaxation for the convexity property. Under certain conditions, the new convex lower bound function is tighter than other lower bound functions developed in the literature. This new lower bound function can be used in a branch and bound algorithm for solving global optimization problems.

Keywords and phrases Global optimization ; α BB method ; branch and bound ; convex lower bound Received before September 15, 2024. Accepted October 3, 2024.

Exact method for the bi-objective portfolio selection prob-

lem with risk-free asset.

Boudjelda Souhaib, Brahmi Belkacem

Unité de recherche Laboratoire de Modélisation et Optimisation des Systèmes, Université de Béjaïa. ALGERIA.

— Abstract -

In recent years, portfolio optimization theory has attracted increasing interest among researchers, due to its crucial contribution to investment decision-making and financial risk management. In this work, we present a new parametric method for solving the Markowitz Mean-Variance model with a risk-free asset. The proposed algorithm allows to iteratively determine all the pivot points associated with the corner portfolios of the problem. Thus, it allows to fully drawing the efficient frontier, as well as plotting the capital market line.

Keywords and phrases Portfolio selection problem ; support method ; efficient frontier ; capital market line ; parametric quadratic programming.

On a New Approach for Solving a Knapsack Problem.

Noria BENKHEMMOU, Fatima HESSAS

Laboratoire de Mathématiques Pures et Appliquées - Université Mouloud Mammeri de Tizi Ouzou, ALGERIA.

— Abstract –

The knapsack problem represents one of the most active research areas of combinatorial optimization. Our approach in this talk consists of using the notion of short generating functions of a finite set in order to find the number of solutions of the Diophantine equation and use it to solve the 0-1 knapsack problem with equality constraint. The path followed to get some results is an improvement of some classical methods known in the literature.

Keywords and phrases Knapsack problem ; Diophantine equation ; generating function. Received before September 15, 2024. Accepted October 3, 2024.

Optimizing a multiobjective probability maximization problem under multivariate normal distributions.

_* * * ___

Ramzi Kasri, Fatima Bellahcène

LAROMAD Laboratory, Faculty of Sciences Mouloud Mammeri University of Tizi-Ouzou, Algeria.

— Abstract –

This paper considers a multiobjective stochastic linear problem with multivariate normal distributions where several probabilities are maximized. It is shown how this problem can be transformed into an equivalent multiobjective nonconvex programming problem whose Pareto optimal solutions are obtained throughout a linear program defined by eigenvalue relaxation. The developed algorithm is based on the combined use of the bisection method and the probabilities of achieving goals. An illustrated example and computational implementation are included in this paper to clarify the developed theory.

Keywords and phrases Multiobjective programming ; Stochastic programming ; Nonlinear programming ; Minimum ; risk criterion.

Multiobjective Traveling Salesman Problem: An exact Approach.

<u>Asma BOUMESBAH</u>, Mohamed El-Amine CHERGUI, Lysa IAMRACHE University of Sciences and Technology Houari Boumediene, BP 32 EL Alia 16111 Bab Ezzouar, Algiers,

ALGERIA.

— Abstract –

The objective of this study is to develop an exact method capable of generating the efficient set for the Multi-Objective Traveling Salesman Problem (MTSP) using a branch-and-bound framework. This method ensures the construction of only efficient Hamiltonian cycles for TSP instances with more than two objectives. The branching process is based on identifying edges shared by at least two non-Hamiltonian cycles within the graph. Through this, linear constraints are iteratively formulated to eliminate cycles while maintaining the graph's connectivity. The graph is then partitioned into sub-graphs, each corresponding to a distinct multiobjective linear program aimed at identifying the set of non-dominated Hamiltonian cycles.

Keywords and phrases Traveling Salesman Problem ; Multiobjective optimization ; Branch and Bound. Received before September 15, 2024. Accepted October 3, 2024.

Time optimal control on a coupled tank system.

SELLAM Idir, MERAKEB Abdelkader.

Laboratoire de Conception et Conduite des Systèmes de Production (L2CSP). Mouloud Mammeri University of Tizi-Ouzou. ALGERIA.

— Abstract -

The coupled tank system is a non-linear system widely used for testing control and estimation methods. The control strategy of such a system consist to manage or maintain tank levels at desired values, this allows us to better understand the behavior of liquid flows in networks. In this work, our contribution consists of presenting a simulation using MatLab of a time-optimal control system on two coupled-tank, with a single control law in an open-loop form. From the bang-bang structure of the time-optimal control resulting from the necessary condition of the Pontryagin Maximum Principle, the approximate solution obtained from direct discretization method is used as initialization solution for the shooting method issue from the PMP indirect method in order to obtain more accuracy solution.

Keywords and phrases Coupled Tank System ; Time-Optimal Control ; Pontryagin Maximum Principle (PMP) ; Bang-Bang structure ; Shooting Method.

Over Mahonian numbers and log-concavity.

Ali KESSOURI, Moussa Ahmia

LMFN Laboratory, Department of Mathematics, University Farhat Abbas -Setif 1, ALGERIA.

— Abstract –

In this paper, we introduce the concept of the "Over-Mahonian number," which represents the number of permutations of length n with k overlined inversions. We explore its properties and provide combinatorial interpretations through lattice paths, overpartitions, and tilings. Additionally, we present a combinatorial proof that these numbers form a log-concave.

Keywords and phrases Overpartitions ; Mahonian numbers ; Over Mahonian numbers ; Log-concavity. Received before September 15, 2024. Accepted October 3, 2024.

*** _

Practical Management of Instrumentation Inventory at SONATRACH: (Q, r) and (R, T) Models in an Industrial Context.

Yassine EKHNACHE, <u>Assia OUTAMAZIRT</u>, Djamil AISSANI, Essaid IDIR Department of Operations Research, University of Bejaia. ALGERIA.

— Abstract –

In this work, we explore the inventory management of instrumentation items at SONATRACH, which is crucial to prevent interruptions in the transportation of petroleum products. We classified the items based on their importance and demand variability using the ABC-XYZ analysis. To optimize inventory levels, we applied two models. The (Q, r) model was used for items with stable demand, ensuring constant replenishment when stock reaches a certain threshold. The (R, T) model was chosen for items with variable demand, allowing stock adjustments at regular intervals. These decisions were made considering various lead times. Although we evaluated the costs associated with each model, our priority was to maintain continuous availability of items to prevent stockouts.

Keywords and phrases SONATRACH; Stock management; ABC-XYZ analysis; Safety stock; Stockout; Instrumentation items; Item availability.

Solving a bi-objective matroid problem.

Ouafa KHELAIFIA, Méziane AïDER

University of Sciences and Technology Houari Boumediene, BP 32 EL Alia 16111 Bab Ezzouar, Algiers, ALGERIA.

— Abstract -

In this paper, the bi-objective matroid problem, which is an NP-hard problem, is tackled. We compare three methods found in the literature: two heuristics and an exact method. These methods are based on the twophase method. The first phase searches for extreme efficient solutions using the weighted sum method, while the second phase searches for non-extreme efficient solutions using two heuristics, 'neighborhood search' and 'adjacent search' and the recursive procedure. We evaluate the performance of the algorithms for different types of matroids, including graphic matroids, uniform matroids, and partition matroids. Our results demonstrate the efficiency and applicability of the proposed approach in solving bi-objective matroid problems.

Keywords and phrases matroid theory ; Two-phase methods ; extrem efficiente solution ; non-extrem efficiente solution ; recursive procedure ; neighborhood search ; adjacent search.

Received before September 15, 2024. Accepted October 3, 2024.

Solving integer indefinite quadratic fractional bilevel programs.

Fatima FALI, Yasmine Cherfaoui

LaROMaD laboratory, Faculty of Mathematics, University of Science and Technology Houari Boumediene, BP 32 El Alia, Bab Ezzouar, 16111, Algiers, ALGERIA.

— Abstract

In this paper, we describe an exact method to solve an integer indefinite quadratic fractional bilevel problem with a single objective at both levels, where the objective functions at both levels are a product of two linear fractional functions. The proposed algorithm generates the integer optimal bilevel solution using a branch and cut algorithm based on a biobjective integer linear fractional problem obtained by replacing the indefinite quadratic fractional objectives at both levels by their two linear fractional functions. Indeed, the upper level indefinite quadratic fractional problem is solved, which the integer optimal solution belongs to the efficient solutions set of the corresponding biobjective linear fractional problem. The found integer optimal solution of the upper level problem is tested for optimality of the main problem by solving the lower level problem. If no optimal bilevel solution is obtained, a cut is added to the upper level problem and the next best optimal solution of the upper level problem is determined. After the presentation of the algorithm, a numerical example and computational experiments are provided.

Keywords and phrases Multi-objective programming ; bilevel programming ; integer programming ; quadratic programming ; linear fractional programming ; branch and cut.

Solving Semi-Infinite Programming by Discretization.

Ahmed AMIROU, Lekhal Redouane, Zahia Zidelmal

Laboratoire de Conception et Conduite des Systèmes de Production (L2CSP), Mouloud Mammeri University of Tizi-Ouzou. ALGERIA.

— Abstract —

This paper introduces a method for solving semi-infinite linear programming (SILP) problems using discretization. The approach involves transforming infinite constraints into a finite set by solving iterative sub-problems with a limited number of constraints. SILP problems feature a finite number of variables constrained by an infinite number of conditions, commonly found in mathematics, economics, and engineering. Utilizing the "direct search method" algorithm, this method effectively addresses SILP problems, demonstrating the efficacy of discretization. Numerical examples underscore the method's efficiency and its applicability across diverse practical contexts.

Keywords and phrases Semi-Infinite Linear Programming ; Discretization ; Linear Programming ; Optimization ; Numerical Methods ; Direct Search Method.

Received before September 15, 2024. Accepted October 3, 2024.

Solving Sustainable Multi-objective Multi-choice Stochastic Transportation Problem.

_* * * _

Thiziri Sifaoui, Méziane AÏDER

LAROMAD, Fac. Sciences, UMMTO, Tizi Ouzou, ALGERIA. Department of Mathematics and Computer Science, Faculty of Sciences and Technology, University of Amine Elokkal El Hadj Moussa Eg akhamouk, Tamanghasset, ALGERIA.

— Abstract -

This paper addresses a Sustainable Multi-choice Stochastic Multi-objective Multi-item Solid Transportation Problem, emphasizing the balance between economic efficiency and environmental sustainability. To manage the uncertainty, the model studied utilizes multi-choice objective function coefficients and normally distributed random variable constraints. The proposed approach consists of using interpolation polynomials based on Newton's divided difference for multiple choice parameters, applying the constraint method to transform the problem into a deterministic equivalent, and using a hybrid method to identify a balanced compromise solution.

Keywords and phrases Multi-choice Stochastic Transportation Problem ; Sustainable development ; interpolating polynomial ; Newton's divided difference ; hybrid method.

Solving the Multi-Objective Stochastic Fractional Integer Programming Problem with Interval-Valued Coefficients.

Leila Younsi Née Abbaci, Mustapha Moulai

Research Unit LaMOS. University of Bejaia, 06000 Bejaia. ALGERIA.

— Abstract ·

In this paper, we consider a Multi-Objective Stochastic Interval-Valued Linear Fractional Integer Programming problem (MOSIVLFIP). We especially deal with a multi-objective stochastic fractional problem involving an inequality type of constraints, where all quantities on the right side are log-normal random variables, and the objective functions coefficients are fractional intervals. The proposed solving procedure is divided in three steps. In the first one, the probabilistic constraints are converted into deterministic ones by using the chance constrained programming technique. Then, the second step consists of transforming the studied problem objectives on an optimization problem with an interval-valued objective functions. Finally, by introducing the concept of weighted sum method, the equivalent converted problem obtained from the two first steps is transformed into a single objective deterministic fractional problem. The effectiveness of the proposed procedure is illustrated through a numerical example.

 $\label{eq:keywords} \begin{array}{l} {\sf Keywords \ and \ phrases} \ \ interval-valued \ function \ ; \ multi-objective \ programming \ ; \ log-normal \ random \ variable \ ; \ interval-valued \ linear \ fractional \ programming. \end{array}$

Received before September 15, 2024. Accepted October 3, 2024.

An Integer Programming Approach to Portfolio Optimization with Indefinite Quadratic Fractional Objective Functions.

Yasmine Cherfaoui

LaROMaD laboratory, Faculty of Mathematics, University of Science and Technology Houari Boumediene, ALGERIA.

— Abstract -

This paper presents a novel approach to optimizing portfolio selection problem using a integer nonlinear programming model where an indefinite quadratic fractional function as an objective. This fractional objective captures the trade-off between system performance and cost, allowing for efficient decision-making. We propose an exact optimization algorithm that combines the strengths of cutting plane and branch-and-bound strategic exploration to effectively solve this challenging problem. Our approach addresses the nonlinearity and integer constraints inherent in engineering design optimization.

Keywords and phrases Portfolio selection ; Optimization ; Fractional programming Integer programming ; Nonlinear programming ; Branch-and-Cut.

Template Side-Channel Attacks with Spectral Computation.

<u>Meriem Mahar</u>, Maamar OULADJ, Sylvain Guilley, Hacene BELBACHIR, Farid Mokrane.

Centre de recherche sur l'Information Scientifique et Technique, 5 rue des trois frères Aissou Ben Aknoun Alger, ALGERIA. Laboratoire Analyse, Géométrie et Applications, LAGA, CNRS, UMR 7539, F-93430, Villetaneuse, FRANCE.

— Abstract —

The so-called Gaussian template attacks (TA) is one of the optimal Side-Channel Analyses (SCA) when the measurements are captured with normal noise. In the SCA literature, several optimizations of its implementation are introduced, such as coalescence and spectral computation. The coalescence consists of averaging traces corresponding to the same plaintext value, thereby coalescing (synonymous: compacting) the dataset. Spectral computation consists of sharing the computational workload when estimating likelihood across key hypotheses. State-of-the-art coalescence leverages the Law of Large Numbers (LLN) to compute the mean of equivalent traces. This approach comes with a drawback because the LLN is just an asymptotic approximation. So it does not lead to an exact Template Attack, especially for a few number of traces. In this paper, we introduce a way of calculating the TA exactly and with the same computational complexity (using the spectral approach), without using the LLN, regardless of the number of messages.

Keywords and phrases Spectral approach ; Template Attack ; Multivariate analysis ; Attack speed-up ; Coalescence ; Law of Large Numbers.

Received before September 15, 2024. Accepted October 3, 2024.

Method of feasible directions for solving linearly constrained multiobjective optimization problems.

Zoubir Ramdani, Smail Addoune, Boualem Brahmi

Faculty of mathematics and computer science, University of Bordj Bou Arreridj. ALGERIA.

— Abstract —

In this paper, we extend Zoutendijk's feasible direction method to solve linearly constrained multiobjective optimization problems. Unlike Morovati and Pourkarimi's algorithm [14], which considers only active constraints, our approach includes all constraints in the directionfinding subproblem. We prove that the sequence generated by the algorithm converges to Pareto-critical points of the problem Both algorithms are implemented in Matlab and compared on various test problems. The numerical results demonstrate the speed of our algorithm in the approximation of the Pareto front.

Keywords and phrases Multiobjective Optimization ; Linear constraints ; Efficient Solution ; Pareto critical point ; Feasible Descent Method ; Direction Finding Subproblems. Received before September 15, 2024. Accepted October 3, 2024.

MOAD'2024- UMMTO.

Primal-Dual approach to optimizing linear problems

Ahlem ZAARAT, Sonia RADJEF

Department of Mathematics, University of Science and Technology Mohamed Boudiaf, Oran, AL-GERIA.

— Abstract -

The purpose of this work is to introduce a novel Primal-Dual approach to optimizing linear problems. Our method is exact and involves proposing a fresh direction for improvement. Additionally, we establish a criterion for assessing optimal solutions. Finally, we present the outcomes of a comparative numerical experiment conducted using computer simulations.

Keywords and phrases Dual and primal problem ; linear optimization ; Adaptive method. Received before September 15, 2024. Accepted October 3, 2024.

A Comparison Between Genetic Algorithm (GA) and Ant Colony Optimization Algorithm (ACO) for Robot Mobile Path Planning.

_* * * _____

Slimani Sami, Zennir Youcef, Saib Bouthina and Femmam Manel 7 Research Laboratory LRPCSI, Université 20 Août 1955 Skikda , 21000 Skikda, ALGERIA

— Abstract –

In our everyday lives, we encounter a wide range of problems that vary in complexity and the methods required to address them. While some issues are straightforward, others demand considerable time and effort to resolve. For these more complex problems, instead of striving for a perfect solution, we often focus on finding an optimal solution quickly through the use of optimization algorithms. This research paper aims to compare the efficiency of two different metaheuristic algorithms in solving a real-life problem: mobile robot path planning. The first algorithm is a Swarm Intelligence (SI) metaheuristic known as Ant Colony Optimization (ACO), while the second is an evolutionary algorithm known as the Genetic Algorithm (GA). The problem is first outlined with relevant definitions, followed by simulation experiments. Both algorithms are applied to solve this real-world problem, and after running each algorithm ten times, the results demonstrate that the Ant Colony Optimization algorithm is more effective than the Genetic Algorithm. The average performance of ACO was 135.138, compared to 153.035 for GA.

Keywords and phrases Meta Heuristic ; Optimization ; Ant Colony Optimizer (ACO) ; Genetic Algorithm (GA) ; Robot Mobile Path Planning Problem ; Swarm Intelligence (SI) ; Evolutionary Algorithm. **Received** before September 15, 2024. **Accepted** October 3, 2024.

New extensions methods for multi-objective stochastic fuzzy global optimization, algorithms (Software) and simulations.

MOHAMMED CHEBBAH

Dept Maths Univ. Tizi Ouzou, ALGERIA.

— Abstract –

Recent results by Zadeh, Belleman and others have had a great impact on academic, professional and industrial sectors. Moreover, fuzziness mixed with Stochastics has allowed the development of new, more realistic approaches. In many Situations of reality, one tends to model the real problems of the life with mathematical programs with deterministic variables (parameters). This hypothesis is little realistic since in reality the variables (parameters) can be impregnated with inaccuracies. With Inaccuracies of Fuzzy nature or of stochastic nature or of stochastic Fuzzy nature. This which subsequently gave rise to examples of: * Fuzzy mathematical programming (variables : L-R, Triangular, Trapezoids,...etc.). * Stochastic mathematical programming. * Fuzzy mathematical programming. * Fuzzy stochastic Global (Multi-Objective) Mathematical Programming . Fuzzy Random Variables give a better formalism to optimization problems modeled as such for example. One can quote in this sense the researchers who contributed in this meaning: Kwakernaak, Kruse, Meyer, Puri, Ralescu, recently, I . Couso, D Dubois, Shapiro, Charnes and Cooper, ...etc. Here is a case of our results to be solved including normal random variables of fuzzy type L-R with left and right deviations of positive real numbers. Subsequently, we will increase the difficulties with non-linear non-convex functions and with multiobjective mathematical problems (Global Optimization).

Keywords and phrases Fuzzy ; Global Optimization ; Mathematical Programming ; multi Objectives ; resolutions ; Numerical simulations ; Software.

Received before September 15, 2024. Accepted October 3, 2024.

_* * *

The incomplete Horadam sequence of order three.

Amrouche Said.

USTHB, Faculty of Mathématics, RECITS Laboratory. P.B. 32, El Alia, 16111, Bab Ezzouar. ALGERIA.

— Abstract -

We define the incomplete Horadam sequence of order three. We study recurrence relations, some properties of these sequence, and the generating function of the incomplete Horadam sequence of order three.

Keywords and phrases Horadam sequence ; generating function. Received before September 15, 2024. Accepted October 3, 2024.

Tiling interpretation of the generalized Fibonacci Colored composition

Chaima Bekkis, Hacène Belbachir and Amine Belkhir

Université des Sciences et de la Technologie Houari Boumediene BP 32 EL Alia 16111 Bab Ezzouar. ALGERIA.

— Abstract —

A composition of a positive integer n is a list of positive integers (called parts) whose sum equals n. A colored compositions is a composition where each part is assigned a fixed number of colors. In this work we give a brief introduction to colored compositions with some well known sequences as the k-Fibonacci sequence, the k-Jacobsthal sequence, and k-Lucas sequence. Using the tilings approach.

Keywords and phrases Compositions ; tilings ; Fibonacci ; Jacobsthal ; colored Compositions. **Received** before September 15, 2024. **Accepted** October 3, 2024.

The generalized \$r\$-Stirling numbers of the first kind

Abdelghafour Bazeniar and Moussa Ahmia

Abdelhafid Boussouf center University of Mila Mila. ALGERIA.

— Abstract –

We propose a new generalization of the r-Stirling numbers of the first kind and their analogues. These numbers appear as specialization of a new class of symmetric function, and they can be seen as a natural generalizations of the r-Stirling numbers of the first kind and their analogues. We also give a combinatorial interpretations of the classical numbers in terms of s-tuples of permutations of [n] with k cycles where the first r elements of each permutation are in distinct cycles. Moreover, using the hyperharmonic numbers and the r-Stirling numbers of the first kind new formulas and useful properties are established.

Keywords and phrases r; Stirling numbers; Symmetric Function; Combinatorial Interpretations; Analogues.. Received before September 15, 2024. Accepted October 3, 2024.

Cube polynomial of s-bonacci cubes

Ryma Ould-Mohamed and Hacène Belbachir

Ben Youcef Ben Khada 2 Rue Didouche Mourad, Alger Centre 16000. ALGERIA.

— Abstract –

s-bonacci cubes, $s \ge 2$, are particular subgraphs of hypercubes, induced by the set of binary strings that do not contain s consecutive ones. In this paper, we study their recursive structure, from which we derive recurrence relations for the number of vertices, the number of edges, and the number of induced k-cubes. We show that the number of edges in s-bonacci cube is expressed as a convolution product of s-bonacci numbers. The number of vertices of weight w is characterized by bisnomial coefficients. We also determine the cube polynomial of s-bonacci cube, including an explicit formula and generating function

Keywords and phrases Hypercube ; cube polynomial ; sbonacci cubes ; sbonacci numbers ; generalized Fibonacci numbers ; bisnomial coefficients

Received before September 15, 2024. Accepted October 3, 2024.

A linear time enumeration of all maximal bicliques of a 4 bipartite distance hereditary graph

Djamel TALEM and Bachir SADI

Laboratoire de Recherche Opérationnelle et de Mathématiques de la Décision. Mouloud Mammeri University of Tizi-Ouzou. ALGERIA.

— Abstract –

Solving some combinatorial optimization problems can be reduced to the problem of computing bicliques in a graph. By definition, a biclique in a graph is a complete bipartite subgraph. The various problems related to biclique computation include : finding a maximum biclique for vertices or edges, enumerating all maximal bicliques, and covering vertices or edges with bicliques. Except for the problem of finding the maximum biclique for vertices, all these problems are difficult when the given bipartite graph is arbitrary. In this paper, we show how to use Lexicographic Breadth-First Search (LexBFS) to enumerate all maximal bicliques in distance-hereditary bipartite graph.

Keywords and phrases s bipartite distance hereditary graph ; biclique ; decomposition of edges (resp. vertices) of bipartite graph into bicliques.

Influence Maximization Problem on Online Social Networks

<u>Bekhti Yamina</u>, Meziane Aider, Mohamed Lalou and Kheddouci Hamamache USTHB PB 32 Bab Ezzouar, 16111 Algiers, ALGERIA.

— Abstract –

This study is dedicated to the maximization of influence within online social networks, focusing on the identification of the minimum Positive Influence Dominating Set (PIDS) in a given network. The PIDS problem originated from online social networks and was first introduced by Wang et al. [9]. They defined it as the selection of a small group of individuals that will propagate efficiently positive influence throughout the entire online network. The associated parameter for PIDS is formulated as a set of nodes (individuals) denoted as P within a given graph (online network), with the condition that each node is either in P or has at least half of its neighbors in P. However, seeking a minimum cardinal PIDS on general graphs or some specific graph classes is NP-hard. In this paper, we present an adaptation of the scatter search metaheuristic to solve the PIDS problem in general graphs. The set of empirical simulations we conducted shows that our method consistently produces satisfactory results, even for large instances of real-world networks.

Keywords and phrases Minimum dominating set ; online networks ; positive influence ; scatter search algorithm Received before September 15, 2024. Accepted October 3, 2024.

Some Results for Appell Sequences

<u>Ghania Guettai</u>, Laissaoui Diffalah, Rahmani Mourad and Sebaoui Madjid Université Yahia Fares de Médéa MEDEA. ALGERIA.

— Abstract —

In this study, we establish various identities and unveil several explicit formulas for Appell polynomials using the generalized Stirling numbers of the first kind. Additionally, we present a three-term recurrence formula for the computation of Appell polynomials. Leveraging the outcomes of our investigation, we derive explicit formulas for certain special sequences of Appell-type polynomials and their extensions, incorporating the weighted Stirling numbers and r-Whitney numbers of the second kind, such as the Frobenius-type Eulerian polynomials of order α . In the concluding section, we introduce and explore a novel category of numbers and polynomials termed sums of powers of integers numbers and polynomials. We outline their properties along with their recurrence formula.

Keywords and phrases Appell sequences ; weighted Stirling numbers ; explicit formulas ; recurrence relations. Received before September 15, 2024. Accepted October 3, 2024.

Analysis of fractional model for infectious diseases with a focus on chronic conditions in Algeria.

Bilal Basti and Rabah Djemiat

Université Mohamed Boudiaf - M'sila. Algeria.

— Abstract –

This paper presents an in-depth analysis of a hybrid mathematical model, the fractional SECIR model, designed to explore the impact of infectious diseases, with particular emphasis on their effect on individuals with chronic conditions. The study delves into the existence and uniqueness of solutions for the proposed model, yielding several stability results based on parameters that adhere to specific conditions to mitigate pandemic occurrences. The model parameters were estimated using data reported by the Algerian health authorities in recent years, facilitating the application of the model to the Algerian context. The findings derived from the application of this mathematical compartmental model indicate that the basic reproduction number for certain infectious diseases in Algeria (COVID-19) is less than one. This observation suggests the potential for disease eradication or effective management through a combination of targeted interventions including vaccination, high-quality treatment, and precise isolation measures.

Keywords and phrases Mathematical modeling ; infectious disease ; chronic conditions ; existence ; stability ; estimation parameters.

Received before September 15, 2024. Accepted October 3, 2024.

On *b*-repdigits as product of consecutive Lucas members

Kouéssi Norbert Adédji, Virgile Dossou-Yovo, <u>Salah Eddine Rihane</u> and Alain Togbé

Université d'Abomey-Calavi Institut de Mathématiques et de Sciences Physiques, Université d'Abomey-Calavi. BENIN.

— Abstract -

A b-repdigit is a positive integer that has only one distinct digit in its base b expansion, i.e. a number of the form $\frac{a(b^m-1)}{(b-1)}$, for some positive integers $m \ge 1, b \ge 2$ and $1 \le a \le b-1$. Let r, s be non-zero integers with $r \ge 1$ and $s \in \{\pm 1\}$, let $\{U_n\}_{n\ge 0}$ be the Lucas sequence given by $U_{n+2} = rU_{n+1} + sU_n$, with $U_0 = 0$ and $U_1 = 1$. In this paper, we give ef-

fective bounds for the solutions of the Diophantine equation $U_n \cdots U_{n+k-1} = a \left(\frac{b^m - 1}{b-1}\right)$, where a, b, n, k, and m are positive integers such that $1 \le a \le b - 1$, and $2 \le b \le 10$. Then, we explicitly solve the above Diophantine equation for the Fibonacci, Pell, and Balancing sequences.

Keywords and phrases Lucas numbers ; b ; repdigits ; logarithmic height ; reduction method Received before September 15, 2024. Accepted October 3, 2024.

Full even k-complete partitions

Syrine Fegas, Hacène Belbachir and Laszlo Nemeth

University of Sciences and Technology Houari Boumediene [Alger] BP 32 EL ALIA 16111 BAB EZZOUAR. ALGERIA.

_* * * _

— Abstract -

This article investigates a specific case of an exclusive type of partition, "full k-complete partitions", previously studied by Augustine Munagi and Ntendeni Takalani. Our work delves into particular instance, referred to as full even k-complete partitions. We examine this type and provide a detailed enumeration of their properties.

Keywords and phrases integer partitions; even partition; complete partitions. Received before September 15, 2024. Accepted October 3, 2024.

A Novel Bicomplex Number System

N. Rosa Ait-Amrane and H. Belbachir

Yahia Fares University of Medea 26 000 Pole Urbain Medea. ALGERIA.

— Abstract -

The purpose of this research is to introduce a novel category of bicomplex polynomials, with components represented by generalized Fibonacci polynomials and unrestricted generalized Fibonacci polynomials . We

present various recurrence relations, summation formulas, Binet formulas, and generating functions associated with these polynomials.

Keywords and phrases Bicomplex Numbers ; Fibonacci Polynomials Received before September 15, 2024. Accepted October 3, 2024.

Sums in the harmonic triangle

Fariza Krim and Hacéne Belbachir

USTHB BAB EZZOUAR, EL ALIA. ALGERIA.

— Abstract –

In the present paper, we consider the Harmonic triangle which is related to reciprocals of Pascal triangle elements. Our goal is to describe the recurrence relation associated to the sum of its elements laying along a ray using the sums of the generalized arithmetic triangle elements along a finite ray. For doing, we establish the corresponding generating function. Also, identities involving reciprocals of binomial coefficients follow and some others that are known but proven differently without using the beta function. We also prove that some sums in the Harmonic triangle are the convolution of well-defined sequences.

Keywords and phrases triangle harmonique ; triangle arithmétique généralisé ; relation de récurrence ; fonction génératrice ; convolution ; coefficient binomial

_* * * _

Received before September 15, 2024. Accepted October 3, 2024.

The incomplete Horadam sequence of order three.

Said Amrouche

University of Science and Technology Houari Boumediene P.B. 32, El Alia, 16111, Bab Ezzouar. ALGERIA.

— Abstract ———

We define the incomplete Horadam sequence of order three. We study recurrence relations, some properties of these sequence, and the generating function of the incomplete Horadam sequence of order three.

Keywords and phrases Horadam sequence ; generating function. Received before September 15, 2024. Accepted October 3, 2024.

* * *

Partitions into parts simultaneously regular and distinct

Nadji Mohammed Lamine and Moussa Ahmia

Université des Sciences et de la Technologie Houari Boumediene. ALGERIA.

— Abstract -

We explore a multi-restricted set of partitions that lies at the intersection of the classical l-regular and t-distinct (parts appearing at most t times) partition sets. In this vein, we introduce the t-Schur's partitions and overpartitions, other equinumerous classes of partitions, and their combinatorial and arithmetic properties.

Keywords and phrases Partition ; Overpartition ; Regular ; Distinct ; Congruence ; Schur's partition theorem Received before September 15, 2024. Accepted October 3, 2024.

*** ___

Explicit values at non positive integers of multiple Hurwitz zeta functions

Boualem Sadaoui

Laboratory LESI, University of Djelali BOUNAAMA, 44225, Khemis Miliana. ALGERIA.

— Abstract —

In this work, we give another method to calculate the values of multiple Hurwitz zeta function at non-positive integers by means of Raabe's formula, and the Bernoulli numbers, and we simplify these values by a symbolic computation techniques.

Keywords and phrases Multiple Hurwitz zeta function ; integral representation ; special values ; Bernoulli numbers ; Raabe's formula.

On a special case of the Vasyunin cotangent sum

Samir Belhadj and Mouloud Goubi

Laboratoire de Mathématiques Pures et Appliquées [Tizi-Ouzou] Université Mouloud Mammeri de Tizi-Ouzou. Algeria.

— Abstract –

Many analytical approaches due to the work of Nymann and Beurling have been given to study the Riemann hypothesis. Among other things, the Báez-DuarteBalazard criterion which confirms an equivalence to the Riemann hypothesis. Thanks to this criterion, the study of the Riemann hypothesis can be reduced to study the distance from the characteristic function of the interval $[1, +\infty]$ to Beurling subspace. Then this distance leads us to evaluate the Vasyunin sum, denoted $V\left(\frac{p}{q}\right)$, which is linked to the study of this distance. Unfortunately the expression of $V\left(\frac{p}{q}\right)$, presents some difficulties to evaluate this distance. For this, we can ask if we could find identities for the Vasynin sum. In this present work, we are mainly interested to give other formulas to the Vasyunin sum.

Keywords and phrases Vasyunin cotangent sum ; Bell polynomials ; generating functions ; Cauchy product ; Dirichlet series

Received before September 15, 2024. Accepted October 3, 2024.

Efficient broadcasts in cycles

Ibrahim Boufelgha

Université Abdelhafid Boussouf [Mila] Centre universitaire de Mila. ALGERIA.

— Abstract –

Let G be a graph and C_n a cycle of order n, a dominating set in a graph G is a subset D of vertices of the graph G such that any vertex belongs either to this set or to the neighborhood of a vertex of D. The broadcast domination problem is a variant of domination problem. A broadcast f is efficient as a broadcast invariant if every vertex in G is f-dominated by exactly one vertex. In this paper, we study the number of different efficient broadcasts that we denote by $N_{eb}(G)$ in a cycle C_n . We determine either bounds or exact values

Keywords and phrases Broadcasts ; efficient broadcasts ; cycles Received before September 15, 2024. Accepted October 3, 2024.

A *q*-analogue of the bi-periodic Fibonacci and Lucas sequences and Rogers-Ramanujan type Identities

Nassima Belaggoun, Hacène Belbachir and Hacène Belbachir

Centre de recherche sur l'Information Scientifique et Technique 5 rue des trois frères Aissou Ben Aknoun Alger. ALGERIA.

— Abstract -

The *bi*-periodic Fibonacci and Lucas sequences are defined by the recurrence relations $t_n = \xi(n)t_{n-1}+t_{n-2}$ and $l_n = \xi(n+1)l_{n-1} + l_{n-2}$, where $\xi(n) = a$ if *n* is even and $\xi(n) = b$ if *n* is odd, with the initial conditions $t_0 = 0$, $t_1 = 1$, $l_0 = 2$, and $l_1 = a$, where a and b are nonzero real numbers. As a special case, by setting a = b = 1, we recover the classical Fibonacci and Lucas sequences, respectively. We introduce

a Cigler-type q-analogue of the biperiodic Fibonacci and Lucas polynomials and derive some of their properties, including recurrence relations, explicit forms, and generating functions. Furthermore, we establish several Rogers-Ramanujan-type identities using the qbi-periodic Lucas polynomials, that allow an approach of the Bailey pairs.

Keywords and phrases q; Bi; periodic Fibonacci polynomials; q; bi; periodic Lucas polynomials; Rogers; Ramanujan identities; Bilateral Bailey Pair.

Received before September 15, 2024. Accepted October 3, 2024.

Practical Management of Instrumentation Inventory at SONATRACH: (Q, r) and (R, T) Models in an Industrial Context

Assia Outamazirt, <u>Yassine Mekhnache</u>, Djamil Aissani and Essaid Idir Department of Operations Research, University of Begaia Targa Ouzemmour. ALGERIA.

— Abstract -

In this work, we explore the inventory management of instrumentation items at SONATRACH, which is crucial to prevent interruptions in the transportation of petroleum products. We classified the items based on their importance and demand variability using the ABC-XYZ analysis. To optimize inventory levels, we applied two models. The (Q, r) model was used for items with stable demand, ensuring constant replen-

ishment when stock reaches a certain threshold. The (R,T) model was chosen for items with variable demand, allowing stock adjustments at regular intervals. These decisions were made considering various lead times. Although we evaluated the costs associated with each model, our priority was to maintain continuous availability of items to prevent stockouts.

Keywords and phrases SONATRACH ; Stock management ; ABC ; XYZ analysis ; Safety stock ; Stockout ; Instrumentation items ; Item availability

Bi-periodic Fibonomial Coefficients

Imène Benrabia, Belbachir Hacene and Nassima Belaggoun

Université des Sciences et de la Technologie Houari Boumediene [Alger] (USTHB) BP 32 EL ALIA 16111 BAB EZZOUAR ALGER. ALGERIA.

— Abstract –

In this study, we introduce a new extension of Fibonomial coefficients, termed bi-periodic Fibonomial coefficients, which are related to bi-periodic Fibonacci numbers. We establish key properties of these coefficients, including recurrence relations and formulas for the powers of bi-periodic Fibonacci numbers. Additionally, we provide a combinatorial interpretation through weighted tilings associated with lattice paths and present combinatorial proofs for identities involving bi-periodic Fibonomial coefficients.

Keywords and phrases Fibonacci sequence ; Bi ; periodic Fibonacci sequence ; Fibonomial coefficient ; Bi ; periodic Fibonomial coefficient ; Partition ; Tilling.

TOPIC : Games Theory

Rough Set Approach to Constrained Bimatrix Game.

Sabiha Djebara, Farida Achemine.

Laboratoire de Recherche Opérationnelle et de Mathématique de la Décision (LAROMAD), Tizi-Oouzou, ALGERIA.

— Abstract –

The aim of this study is to propose a new and straightforward approach for solving constrained bimatrix games where both payoffs and constraints are represented by rough intervals. Given that the payoffs and constraints in these rough constrained bimatrix games are rough intervals, the value of the game is also expressed as a rough interval. In this approach, we derive four bilinear programming problems to calculate the upper-lower bound, lower-lower bound, lower-upper bound, and upper-upper bound of the rough interval values. Additionally, the expected value operator of the rough interval is used to determine the optimal solutions for the rough constrained bimatrix game.

Keywords and phrases Constrained Bimatrix Games ; Rough Interval ; Linear Programming Problem. Received before September 15, 2024. Accepted October 3, 2024.

_* * * __

Evaluation of Lax-Friedrichs and MacCormack Numerical Schemes in Dam Break Simulation Using Saint-Venant Equations.

Taous Douali, Hassina Arroudj, Fatah Bouhmila.

Laboratoire de Recherche Opérationnelle et de Mathématiques de la Décision. Mouloud Applied Mathematics Laboratory, University of Abderrahman Mira, Béjaia. ALGERIA.

— Abstract –

In this study, two explicit schemes of Lax-Friedrichs and McCormack are used to simulate the dam break wave problem. In order to improve the results of numerical simulation, we performed a comparative study of these two schemes; these comparisons allow us to choose the numerical method suitable for the simulation of the dam break wave. The results are presented in one space dimension.

Keywords and phrases Saint-Venant ; dam break ; Lax-Friedrichs scheme ; MacCormack scheme. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Games Theory

Analysis through Game Theory of the Impact of Natural Resource Rent Variability on Incentives to Reform

Abdelhakim LOUNACI, Saïd Souam

Centre de Recherche en Economie Appliquée pour le Développement (CREAD), Rue Djamel Eddine El-Afghani- El Hammadia Bouzaréah - Alger. ALGERIA.

— Abstract –

Reform, defined as a profound change aimed at improvement, is pursued by many countries and international organizations to accelerate economic growth and enhance living conditions. However, its implementation often faces challenges due to policymakers' reluctance, costs, and various political and technical obstacles. While some nations swiftly embrace reforms, others cling to the status quo, leading to mixed success rates. This paper contributes to understanding the conditions fostering reform emergence in undemocratic countries. It explores the incentives for reform, using game theory tools to analyze scenarios where authoritarian elites must decide between reform and maintaining the status quo. Additionally, it investigates how the variability of resources impacts incentives for reform within authoritarian regimes.

Keywords and phrases Political economy ; Game theory ; Reforms ; Status quo ; Incentives ; Natural resources ; Authoritarian regime.

Received before September 15, 2024. Accepted October 3, 2024.

Bimatrix Games under Uncertainty: A Survey

Farida Achemine, Moussa Larbani

Laboratoire de Mathématiques Pures et Appliquées. Université Mouloud Mammeri de Tizi Ouzou, 15000, ALGERIA.

— Abstract –

Bimatrix games serve as powerful tool for modeling strategic interactions in various fields, ranging from economics to biology and beyond. However, the presence of uncertainty adds a layer of complexity to the decision-making processes within bimatrix games, influencing equilibrium solutions and strategic outcomes. This review provides a comprehensive analysis of bimatrix games under uncertainty, exploring theoretical perspectives, modeling techniques, applications, and future directions. We examine the impact of uncertainty on equilibrium concepts, solution methodologies, and decision-making strategies within bimatrix games. Furthermore, we discuss some potential directions of research.

Keywords and phrases Bimatrix game under uncertainty ; Random variables ; Fuzzy random variables ; Fuzzy numbers ; Rough set ; Liu's Uncertanty.

TOPIC : Artificial Intelligence

A New Trajectory Planning Methode for Mobile Robots Inspired by Plant Intelligence.

Lyes Tighzert, Smail Berrah and Boubekeur Mendil IMER Bejaia. ALGERIA.

— Abstract -

This paper presents a new bio-inspired path planning technique inspired by plant intelligence and phototropism. It is called phototropism-based trajectory planning (PTP). The idea is to make use of spherical coordinates to construct a virtual tree which is capable of growing from random initial positions towards the goal position. The growing process imitates the phototropism phenomena observed in plants which are growing towards light. We assume that the goal position produces light and the obstacles produce darkness. According to a simplified model of growth, at each iteration, the virtual tree produces new buds from its branches. A fitness function is used to deal with path planning problem as an optimization problem. Such an evolutionary algorithm, the fittest branches will produce more buds than worst branches allowing the tree to grow toward better regions in search space and to reach finally the goal position. The path followed by the tree is then used as a trajectory of a mobile robot. The proposed method is applied to a two wheeled mobile robot. The kinematic and dynamic models are first presented, then the PTP and the automatic control solution are presented. The obtained results show the effectiveness of the proposal.

Keywords and phrases Plant intelligence ; phototropism ; path planning ; modeling ; control ; robotics. Received before September 15, 2024. Accepted October 3, 2024.

Splitting Argumentation Frameworks Based on Monophonic Convexity in Graphs

Mohammed Elaroussi

Unité de Recherche LaMOS, 06000 Bejaia. ALGERIA.

— Abstract -

This paper explores the application of graph-theoretic concepts, particularly monophonic convexity, to efficiently partition argumentation frameworks. These frameworks are represented as directed graphs, where nodes correspond to arguments and directed edges indicate attacks. Based on established results in graph theory, which show a polynomial-time solution for partitioning a graph into two monophonic convex sets, we investigate how these techniques can enhance the resolution of the Credulous Acceptance problem in argumentation

Keywords and phrases Splitting Argumentation Frameworks; Monophonic convexity; Credulous acceptance. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Artificial Intelligence

Advanced Approaches for Network Function Placement in the Cloud: Extended Results and In-Depth Analyses.

Imad Eddine Said, Lamri Sayad and Aissani Djamil

Unité de recherche Laboratoire de Modélisation et Optimisation des Systèmes [Université de Béjaïa] Rue Targa Ouzemour, Bejaia . ALGERIA.

— Abstract –

To address the exponential growth in demand for network services, the paradigm of Network Function Virtualization (NFV) has been introduced to increase the f lexibility of resource management within operators' networks. The critical challenge in NFV environments is to define an efficient assignment of Virtual Network Functions (VNFs) to hosting servers in order to enhance Quality of Service (QoS) and reduce Capital Expenditure (CAPEX) and Operating Expenditure (OPEX). In our previous work presented at the fifth edition of the MOAD conference[10], we proposed a multi-objective integer linear programming model to minimize endto-end latency and the number of servers used, while ensuring maximum VNF connectivity, solved using the IBM CPLEX solver for a small-sized network. In this paper, we extend our previous work by introducing an advanced version of our Particle Swarm Optimization (*PSO*) algorithm, optimized for large-scale scenarios. Our results show significant performance improvements in terms of latency reduction and resource utilization.

Keywords and phrases Cloud ; Virtualization ; Virtual Network Function Placement ; Multi ; objective Optimization ; Metaheuristics.

TOPIC :Artificial Intelligence

Impact of sudden torsional loading on a finite isotropic elastic material

Loukmane Zeddam, Fateh Madani, Bassam Gamal Nasser Muthana and Kirad Abdelkader

Laboratory of Energy Processes and Nanotechnology. Department of Mechanics. Faculty of Technology. University of Blida 1. ALGERIA.

— Abstract

This study investigates the dynamic response of an isotropic elastic material subjected to sudden torsional loading induced by a rigid disk. By employing dynamic equilibrium equations, Hankel and Laplace transforms, and numerical techniques, we derive expressions for stress and displacement. The problem is formulated as a system of dual integral equations, which are subsequently reduced to Fredholm integral equations of the second kind. Numerical solutions are obtained using Gaussian quadrature and Zakian's algorithm. Dimensionless plots were presented to demonstrate the influence of layer thickness, and the shear wave velocity. These findings can be used as a tool for predicting the crack initiation around disk edges for optimizing the design of structures subjected to torsional loads.

Keywords and phrases Sudden torsion load ; Rigid disk ; Hankel transform ; Laplace transform ; Stress intensity factor ; Fredholm integral.

TOPIC : Mathematical Modeling

Calculation of Weibull parameters and function density simulation in region of Saida, (Algeria).

Toufik Sahabi

University of Saida BP 138 cité ENNASR 20000, Saida. ALGERIA.

— Abstract —

In this research, we explored two methods for assessing the wind energy potential in the Saida region for the possible installation of wind turbines. The first method involved a computational approach using wind speed measurements from the year 2023. We calculated the Weibull shape parameter k and scale parameter c using the graphical representation method of the partition function (or cumulative frequencies). Additionally, we simulated wind speeds over 8760 hours for the year 2023. The simulated results closely matched the experimental data, providing further insights and predictions.

Keywords and phrases Weibull parameters; Monte Carlo simulation; Wind turbine; Cumulated frequencies. Received before September 15, 2024. Accepted October 3, 2024.

Analysis of fractional model for infectious diseases with a focus on chronic conditions in Algeria.

Bilal Basti and Rabah Djemiat

Université Mohamed Boudiaf - M'sila. ALGERIA.

— Abstract -

This paper presents an in-depth analysis of a hybrid mathematical model, the fractional SECIR model, designed to explore the impact of infectious diseases, with particular emphasis on their effect on individuals with chronic conditions. The study delves into the existence and uniqueness of solutions for the proposed model, yielding several stability results based on parameters that adhere to specific conditions to mitigate pandemic occurrences. The model parameters were estimated using data reported by the Algerian health authorities in recent years, facilitating the application of the model to the Algerian context. The findings derived from the application of this mathematical compartmental model indicate that the basic reproduction number for certain infectious diseases in Algeria (COVID-19) is less than one. This observation suggests the potential for disease eradication or effective management through a combination of targeted interventions including vaccination, high-quality treatment, and precise isolation measures.

Keywords and phrases Mathematical modeling ; infectious disease ; chronic conditions ; existence ; stability ; estimation parameters.

TOPIC : Mathematical Modeling $_{\star\star\star}$

Fractional Stochastic Differential Equation Model for Disease Dynamics

Khelifa Berkane, Omar Kebiri and Abdeldjebbar Kandouci

Dr. Moulay Tahar University of Saida, P.B 138 Ennasr 20000, Saida. ALGERIA.

— Abstract -

The purpose of this paper is to study the dynamics of a stochastic SIRDS epidemic model and formulate the model as a fractional stochastic differential equation (FSDE, in short) driven by a fractional Brownian motion with Hurst index $H \in (\frac{1}{6}, \frac{1}{2})$. We prove the existence and uniqueness of the global positive solution using the Itô formula and random Lyapunov function theory. The sufficient conditions for disease extinction are obtained.

 $\label{eq:keywords} \begin{array}{l} {\sf Keywords \ and \ phrases \ stochastic \ SIRDS \ model \ ; \ fractional \ Brownian \ motion \ ; \ symmetric \ integral \ ; \ existence \ and \ uniqueness \ ; \ extinction \end{array}$

Received before September 15, 2024. Accepted October 3, 2024.

Global Stability Analysis of an Age-Structured SEIR Model with Relapse

Abderrazak Nabti

University of Tebessa. ALGERIA.

— Abstract ·

The age-structured approach plays a crucial role in epidemiological modelling as it accounts for age-specific variations in susceptibility, transmission and disease progressions, providing a more accurate description of disease dynamics. In this paper, we create an age-structured epidemic model that incorporates agedependent susceptibility and latency, as well as a relapse phase, with the objective of investigating the global dynamics of this model under the impact of that combination. The very important threshold parameter R_0 was introduced, and it has shown that it completely controls the stability of each equilibrium of the model. Based on the Lyapunov functional approach, we show that the disease-free equilibrium is globally asymptotically stable when $R_0 < 1$, while the positive endemic equilibrium is globally asymptotically stable whenever $R_0 > 1$. Our results suggest that early diagnostic of latency individuals, reduction in transmission rate and improvements in treatment and heath-care of infected individuals may effectively control the spread of the disease.

Keywords and phrases Age Structured model; Global Stability; Lyapunov Functional. Received before September 15, 2024. Accepted October 3, 2024.
Innovative techniques for solving nonlinear multiplicative polynomial problems

Fadila Leslous, Goubi Mouloud and Ouanes Mouhand

Department of Mathematics Faculty of Sciences, UMMTO University, Laboratory of Operational Research and Mathematics (LAROMAD). TIZI OUZOU. ALGERIA.

— Abstract -

This article is devoted to the study of nonlinear multiplicative global optimization problems (NLMPs) obtained from the product of n polynomials, each of degree two. First, we revisit some classical methods for solving such problems. Then, we introduce a new method based on techniques from number theory. This novel approach aims to improve the efficiency and effectiveness of solving NLMPs, offering insights that could transform approaches to similar optimization challenges. Through theoretical analysis and practical examples, we demonstrate the applicability and advantages of incorporating number-theoretic techniques into the realm of nonlinear multiplicative optimization. This study seeks to contribute to both theoretical advancements and practical solutions in optimization theory and its applications across various disciplines.

Keywords and phrases Nonlinear multiplicative programming ; Nonlinear programming ; Global optimization ; Polynomial optimization.

Received before September 15, 2024. Accepted October 3, 2024.

Mathematical modelling for the dynamic of COVID-19 epidemic in discrete time

Amar Debbouche

Guelma University Department of Mathematics, Guelma 24000. ALGERIA.

— Abstract -

In this work, we consider a discrete-time variable-order SEIQR model incorporated for COVID-19. First, we show the well-possedness result. Then, the disease-free and the endemic equilibrium points are determined. Moreover, we establish the local asymptotic stability of the model. Further, we introduce an optimal control problem involved with variable-order discrete COVID19 model. Finally, we support our obtained results with numerical simulations.

Keywords and phrases COVID ; 19 model ; Variable ; order discrete calculus ; optimal control ; stability ; numerical simulation.

Simulation of a Web services discovery and composition system

Bernine Nassima and Aissani Djamil

Unité de Recherche LaMOS, Département Recherche Opérationnelle, Béjaïa. ALGERIA

— Abstract -

A Web service designates a new type of software component having the capacity to publish its functions on the Internet in the form of services, and to make these services easily invocable and to make them available to clients through standard Internet protocols. In this work, we modeled a system of simple and composite Web services and evaluated the performances. First we proposed a model based on colored Petri nets with synchronization of two queues, the first represents the Web services and the second represents the requests of the clients, the Web services and the clients are defined by colors. Performance was evaluated using a special "Colored Petri Nets Tools (CPN Tools)" simulator for colored Petri nets where we determined the average number of clients, average number of Web services and average number of clients served.

Keywords and phrases Web services ; Performance evaluation ; Colored Petri net ; CPN Tools simulator. Received before September 15, 2024. Accepted October 3, 2024.

Modeling And Analysis Of Performance Measures For An M/M/1 Under N-Policy Working Vacation Balk

***_

Abir Kadi, Mohamed Boualem and Nassim Touchr

University of Bejaia, Department of Mathematics, Laboratory of Applied Mathematics. ALGERIA

— Abstract -

In this work, we consider an M/M/1/K queueing model with impatient customers (balking and reneging) and a single working vacation policy operating under the Npolicy discipline, assuming the customers' impatience is due to the server's vacation. We examine the scenario where the server must wait for the number of customers to reach N to start a regular busy period. Otherwise, the server will initiate a working vacation or switch to the dormant state if the number of customers increases. For the proposed model, steady-state probabilities were derived using the Markov recursive method. This approach allowed us to construct a mathematical framework that captures the system's behavior and derives key performance metrics. Finally, to evaluate the performance measure of queue length, we have conducted a sensitivity analysis by running a simulation for a specific set of parameters.

Keywords and phrases Finit queueing system ; Idle server ; N policy ; Performance measures ; Working vacation.

Two new conjugate gradient methods with application in conditional model regression function

Mehamdia Abd Elhamid

Mohamed Cherif Messaadia University, Souk Ahras, 41000. ALGERIA.

— Abstract -

The conjugate gradient method is one of the most important ideas in scientific computing, it is applied to solve linear systems of equations and nonlinear optimization problems. In this work, based on a variant of Dai-Yuan (DY) method and Fletcher-Reeves (FR) method, two modified CG methods (named IDY and IFR) are presented and analyzed. The search direction of the presented methods fulfills the sufficient descent

condition at each iteration. We establish the global convergence of the proposed algorithms under normal assumptions and strong Wolfe line search. Preliminary elementary numerical experiment results are presented, demonstrating the promise and effectiveness of the proposed methods. Finally, the proposed methods are further extended to solve the problem of conditional model regression function.

Keywords and phrases Conjugate gradient method ; Inexact line search ; Descent condition ; Global convergence ; Numerical comparisons ; Conditional model regression ; Kernel estimatorReceived before September 15, 2024. Accepted October 3, 2024.

Traffic Signal Timing Optimization with Genetic Algorithms: Modeling Techniques and Simulation Results

_* * * ___

<u>Sabiha Larbi</u>, Fazia Rahmoune, Mohammed Said Radjef and Zohra Aoudia University of Bejaia, Research Unit LaMOS, Bejaia, 06000. ALGERIA.

— Abstract -

This paper introduces two polling models with distinct vacation service policies. Aimed at optimizing traffic light management at intersections. The objective is to minimize vehicle waiting times by dynamically adjusting the duration of green lights according to real-time traffic conditions. A genetic algorithm was employed to determine the optimal timing plans for each phase. The models were tested using the SUMO (Simulation of Urban MObility) simulator. The results determine the model that improves system performance, significantly reduces congestion and vehicle dwell times.

Keywords and phrases Traffic light management ; Polling System ; Multi ; objective Optimization ; Simulation. Received before September 15, 2024. Accepted October 3, 2024.

Predictive Modeling of Brucellosis Outbreaks in Algeria: Comparing SARIMA, NNAR, and Hybrid Models for Accurate Forecasting

AKERMI Seif Eddine

Laboratory L'IFORCE, Dept of Operations Research, Fac. Maths, USTHB. ALGERIA

— Abstract -

Brucellosis remains a significant public health concern in Algeria, characterized by endemicity and sporadic epidemics. This study aimed to provide an epidemiological overview of brucellosis in Algeria while comparing the performance of different prediction models using surveillance data from Tébessa province. Seasonal Autoregressive Integrated Moving Average (SARIMA) models, Autoregressive Neural Network (NNAR) models, and SARIMA-NNAR hybrid models were developed to forecast monthly brucellosis notifications. The predictive accuracy of these models was evaluated using metrics such as Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). The results demonstrated that $SARIMA(2, 1, 3)(1, 1, 1)_{12}$, $NNAR(12, 1, 6)_{12}$, and $SARIMA(2, 1, 3)(1, 1, 1)_{12} -$ $NNAR(5,1,4)_{12}$ exhibited the best fit to the data. The SARIMA and SARIMA-NNAR models outperformed the NNAR model, as indicated by lower RMSE, MAE, and MAPE values. The findings suggest that SARIMA and SARIMANNAR models are suitable for accurately predicting human brucellosis cases. Accurate forecasts and incidence mapping of brucellosis can provide valuable support for veterinary and health policymakers in devising informed, effective, targeted strategies, and timely interventions. In conclusion, the development of robust prediction models for brucellosis outbreaks in Algeria, utilizing SARIMA, NNAR, and hybrid approaches, demonstrates their potential to enhance public health response. These models enable policymakers to make informed decisions and implement proactive measures to mitigate the impact of brucellosis outbreaks.

Keywords and phrases Epidemiology ; Time Series Analysis ; Seasonal Autoregressive Integrated Moving Average (SARIMA) ; Autoregressive Neural Network (NNAR) ; Hybrid Models ; Disease Forecasting ; Predictive Modeling

Numerical analysis & Partial differential equations

A Case Of Recurrence In The Absolute Difference Chains With Heavy Tailed Increments.

Sabira Ben Alia and Mohammed Hachama

aboratory of AMNEDP, Departement of mathematics, 6 B.P. 32, El Alia, Bab Ezzouar, 16111 Alger. ALGERIA.

— Abstract –

In this work, we propose a new model for image fusion in which we combine a fidelity term on a subregion with a nonlocal poisson equation. Our model is based on nonlocal differential operators to exploit the similarities between nonlocal distant pixels and regions. Experimental results show that the proposed model achieves state-of-the-art performance in term of visual quality

Keywords and phrases Image fusion ; Poisson equation ; Nonlocal differential operators ; Energy minimization. Received before September 15, 2024. Accepted October 3, 2024.

_* * * _____

A Generalized Contraction Mapping Applied for Existence of the Generalized Sturm-Liouville-Langevin Equation.

<u>Hacen Serrai</u>

Applied Mathematics Laboratory, Kasdi Merbah University, BP511, Ouargla. ALGERIA.

— Abstract -

The fractional Langevin equation provides a powerful mathematical framework for studying the motion of particles in complex environments where anomalous diffusion occurs, and the fractional Sturm-Liouville equation is a mathematical tool for studying particle behavior in complex systems, like fluid diffusion or string vibration, helping understand anomalous diffusion that deviates from classical rules. This paper intends to study the existence of solutions for an ordinary hybrid version of the generalized Sturm-Liouville-Langevin (GSLL) equation under boundary condition using a different approach that is based on the technique of α contraction via admissible mapping in the fixed point theorem. The Ψ -Hilfer fractional-order derivative (Ψ -Hilfer FOD) is used to model this problem, an example is given to illustrate the applicability of our work. The results are novel and extend some of the findings known in the literature

Keywords and phrases Psi; Hilfer fractional; order derivative; fractional Sturm; Liouville equation; fractional Langevin.

Numerical analysis \mathscr{C} Partial differential equations

Asymptotic modeling of the effect of a thin layer inserted between two elastic plates.

Hakim Arab and Leila Rahmani

Laboratoire de Mathématiques Pures et Appliquées. Mouloud Mammeri University of Tizi-Ouzou. ALGERIA.

— Abstract –

In this work, we are interested in modelling the effect of a thin layer inserted between two elastic plates. An approximate model is given which does not involve the thin layer geometrically, but which accounts for its effect through new approximate transmission conditions. The study is based on an asymptotic analysis of the solution to the problem, taking the thickness of the thin layer as a small parameter. The model studied is nonlinear and is the dynamic Von Karman model, which describes the behavior of the multi-structure in large deformations. An approximate asymptotic model has been obtained by passing to the limit in the variational formulation of our initial problem.

Keywords and phrases Asymptotic analysis; Plates; thin layers; Von Karman's model; inclusion; approximate transmission conditions; nonlinear PDEs.

Received before September 15, 2024. Accepted October 3, 2024.

Banach's fixed point theorem for studying space-fractional wave equations.

Rabah Djemiat and Bilal Basti

Laboratory of Pure and Applied Mathematics, Mohamed Boudiaf University of M'sila. ALGERIA.

— Abstract —

This paper investigates the problem of existence and uniqueness of one solution under the traveling wave form for a free boundary problem of a space-fractional wave equation. It does so by applying the Banach's fixed point theorem.

Keywords and phrases Traveling wave solutions; wave equation; space-fractional order; existence; uniqueness. Received before September 15, 2024. Accepted October 3, 2024.

Numerical analysis & Partial differential equations

Extreme points and strict convexity of the Besicovitch-Orlicz space of almost periodic functions equipped with Luxemburg norm.

Slimane Hassaine and Fatiha Boulahia

Laboratoire de Mathématiques Pures et appliquée. University Mouloud Mammeri de Tizi-Ouzou. ALGERIA.

— Abstract –

In this work we characterize the extremes points and stric convexity of the Besicovitch-Orlicz space of almost periodic functions equipped with Luxemburg norm and give some property of this space.

Keywords and phrases Besicovitch-Orlicz space, almost periodic functions, extreme points, strict convexity. Received before September 15, 2024. Accepted October 3, 2024.

Existence and Multiplicity of Solutions for GJMS Operators (k=2 Paneitz-Branson Equations) on Non-Einstein Manifolds.

Touati Mohamed and Hichem Boughazi

Laboratory ACEDP, Faculty of Science, University Djillali Liabes of Sidi Bel-Abbes. ALGERIA.

— Abstract -

Let (M, g) be a smooth compact Riemannian manifold of dimension $n \geq 5$. Denote P_g^n the Paneitz-Branson operator. In this paper, we define the Paneitz-Branson invariants μ, μ_1 . 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.

Keywords and phrases Fourth-order elliptic equation; Paneitz-Branson operator; Eigenvalues. Received before September 15, 2024. Accepted October 3, 2024.

Numerical analysis \mathscr{C} Partial differential equations

Exponential stability in the context of mild solutions for neutral impulsive functional evolution equations.

Berrighi Fatma and Medjadj Imene

Department of Mathematics, University of Mohammed Boudiaf (USTO-MB), Oran. ALGERIA.

— Abstract -

By employing Schauder's fixed point theorem, we will establish essential criteria that ensure the existence and exponential stability of mild solutions for first-order impulsive neutral functional evolution equations, governed by local conditions within a separable Banach space. To illustrate the practical application and validate the theoretical results, an example is presented, demonstrating the effectiveness of the proposed approach

Keywords and phrases Impulsive functional differential equations; mild solutions; fixed point; semigroups; separable Banach space.

Received before September 15, 2024. Accepted October 3, 2024.

Fractional differential equations on closed sets.

Habib Ameur and Omar Benniche

Department of Mathematics, Djilali Bounaama University, Khemis-Miliana. ALGERIA.

— Abstract -

We consider the viability problem for a fractional differential equation of the form $D_{t_0}^q y(t) = f(t, y(t))$ where $f: G \to \mathbb{R}^n$ is a given function, $G = [a, b) \times K$ with $K \subset \mathbb{R}^n$ and $D_{t_0}^q y$ stands for the Caputo derivative. We introduce a fractional tangency definition that characterizes a cylindrical domain viability with respect to the above fractional equation. As application, a physical system is investigated.

Keywords and phrases Viability, Fractional differential equation, Tangency condition. Received before September 15, 2024. Accepted October 3, 2024.

Numerical analysis & Partial differential equations

Full-descretization and semi-descretization for a viscoelastic wave equation.

Abed Yfrah and Melouka Remil

Laboratory of Fundamental and applied mathematics (LMFAO). University of Oran 1. ALGERIA.

— 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.

Keywords and phrases finite element; viscoelastic; dynamic boundary conditions; fully discrete approximation. Received before September 15, 2024. Accepted October 3, 2024.

Numerical Analysis of the Influence of a Uniform Horizontal Magnetic Field in a Square Cavity with Heat Sources and Hybrid Nanofluid: Application of Partial Differential Equations.

Belkacem Ait Taleb, Adel Sahi and Djamel Sadaoui

Faculté de Technologie, Laboratoire de Mécanique Matériaux et Energétique, Faculté de Technologie, Université de Bejaia, 06000 Bejaia. ALGERIA.

— Abstract -

Numerical analysis investigates in natural convection within a square cavity containing a hybrid nanofluid in the presence of a uniform horizontal magnetic field. The cavity's left and right walls are subjected to cooling temperatures, while the top and bottom walls are adiabatic. Four uniformly distributed square heatgenerating blocks are placed inside the cavity. The governing differential equations are solved using the finite volume method, employing the SIMPLE algorithm and the Boussinesq approximation.

Keywords and phrases MHD; Heat source; Square cavity; Natural convection; Hybrid Nanofluid. Received before September 15, 2024. Accepted October 3, 2024.

Numerical analysis \mathcal{B} Partial differential equations

On a class of nonlocal problems arising in neutron transport theory.

Benaoudia Djamila

Laboratoire de Mathématiques Pures et Appliquées. Mouloud Mammeri University of Tizi-Ouzou. ALGERIA.

— Abstract –

In the present work we study the existence of solution to some integro-differential problems arising in the neutron transport theory. In the case of cylindrical domains, we use the singular perturbations method to show the existence of such solutions. The perturbed problems are classical, nonlocal, semilinear hyperbolic problems. Schauders fixed point theorem guarantees the existence of solutions to the perturbed problem and the limits of the solutions of this problems are solutions of our integro-differential problem.

Keywords and phrases Integro-differential problems, anisotropic singular perturbations, Semilinear hyperbolic problems, neutron transport.

Received before September 15, 2024. Accepted October 3, 2024.

On the exponential stabilization of the electromagnetoelastic system with Wentzell conditions.

Boureghida Remissa

University of Science and Technology Houari Boumediene, Algiers. ALGERIA.

— Abstract –

We consider the stabilization of the electromagnetoelastic system with Wentzell conditions in a bounded domain of \mathbb{R}^3 . Using the multiplier method we prove an exponential stability result under some geometric condition. Previous results of this type have recently been obtained for the coupled Maxwell/wave system with Wentzell condition.

Keywords and phrases elasticity equations; Maxwell system; natural feedbacks; stability; Wentzell conditions Received before September 15, 2024. Accepted October 3, 2024.

Numerical analysis \mathscr{E} Partial differential equations

***___

Some results in terms of convergence of closed operators in different spaces.

Hassan Zine

Laboratoire de Mathématiques Pures et Appliquées. Mouloud Mammeri University of Tizi-Ouzou. ALGERIA.

— Abstract –

The theory of linear operators is considered as one of the most useful and interesting mathematical theories in real or complex functional analysis. This theory has

received a lot of attention and its importance over the real or complex fields has led many researchers to try and extend this concept to Several fields.

Keywords and phrases asymmetric normed space; gap; closed operators. Received before September 15, 2024. Accepted October 3, 2024.

_* * * _

Well-posedness problem for a fractional differential parabolic equation with non-local condition.

Bouthina Sabah Hammou, Abdelkader Djerad and Ameur Memou

Laboratory of Pure and Applied Mathematics, Department of Mathematics, University of Msila. AL-GERIA.

— Abstract –

The aim of this paper is to investigate the existence and uniqueness of the strong solution for a differential fractional parabolic equation with non-local condition. The investigation is conducted based on the energy inequality method and the density of the operator generated by the considered problem.

Keywords and phrases Energy inequality; Fractional differential equation; Caputo derivatives; Integral boundary conditions; Strong solution.

Numerical analysis & Partial differential equations ***

Weak solutions for double phase problem with $L^{m(.)}(\Omega)$. data

Hellal Abdelaziz

Laboratory of Functional Analysis and Geometry of Spaces. University of M'sila. ALGERIA.

— Abstract -

tions for a certain class of variable exponent nonlinear Lebesgue-Sobolev spaces with variable exponents.

In this work, we establish the existence of weak solu- double phase problems. The functional setting involves

Keywords and phrases Nonlinear elliptic equations; weak solutions; double phase problem; variable exponents. Received before September 15, 2024. Accepted October 3, 2024.

_____* * * * _____

Well-posedness and general decay for viscoelastic wave equation with time-variying delay.

Dounia Bouchelil and Billal Lekdim

University Ferhat Abbas Setif 1. Algeria.

— Abstract —

In this work we consider evolution problem with memory in a bounded domain and varying delay term. Under certain assumptions about the function ϕ , we

establish well-posedness of our prob- lem by using the Faedo-Galerkin method. Next, we prove stability of problem by using Lyapunov functional.

Keywords and phrases Wave equation; General decay; Viscoelastic term; Well posedness. Received before September 15, 2024. Accepted October 3, 2024.

Numerical analysis \mathscr{E} Partial differential equations

Well-posedness and stability results for the Korteweg-de Vries equation in bounded domain.

Mohammed Allali

Laboratory of Mathematics. University Ahmed Ben Bella oran 1. ALGERIA.

— Abstract -

In this study, our focus has been on establishing the existence and uniqueness of the solution for the nonlinear Korteweg-de Vries equation with delay and analyzing the stability of this equation with a constant delay in the boundary feedback. Exponential stability results have been demonstrated using the energy decay of the system and a Lyapunov functional.

Keywords and phrases Korteweg-de Vries equation; exponential stability; energy of system, Lyapunov functional.

Received before September 15, 2024. Accepted October 3, 2024.

Well-posedness and stabilization of the wave equation by the boundary dissipation with fractional derivative.

<u>Rafa Said</u> and Benaissa Abbes

University of Médéa Médéa. Algeria.

— Abstract –

This work is devoted to the study of the existence and uniqueness of the solution and asymptotic stability of the wave equation by the boundary dissipation with the fractional derivative. We establish the well-posedness by using the semigroup theory and the asymptotic stability by the Arendt-Batty criteria. In other hand we also prove that the system lacks exponential stability.

Keywords and phrases Wave equation; semigroups; general boundary dissipation; fractional derivative; strong stability.

TOPIC : Control & Dynamical systems

Static Output Stabilization of Linear Systems with Parameter Uncertainties Enhanced LMI Conditions

Bibi Hamza and Fazia Bedouhene

Universite de Medea, ALGERIA.

— Abstract -

This paper addresses the design of a robust static output feedback controller using Linear Matrix Inequalities (LMIs) for a specific class of continuous linear systems with parameter uncertainties. Typically, this problem leads to the feasibility of a Bilinear Matrix Inequality(BMI), which is challenging to linearize in order to obtain non-conservative LMI conditions. To tackle this issue, we introduce a novel technique leveraging Finsler's lemma to transform the BMI into a new LMI formulation. The resulting conditions are shown to be less conservative compared to existing approaches in the literature. Analytical and numerical evaluations are presented to demonstrate the superiority of our proposed method.

Keywords and phrases Static output; Lyapunov function; Linear Matrix Inequalities(LMIs). Received before September 15, 2024. Accepted October 3, 2024.

Variational method for delay differential equations.

____* * * * _____

<u>Fatima Dib</u>, Mustapha Yebdri and NaimaDaoudi-Merzagui University centre of Maghnia. ALGERIA.

— Abstract –

In this paper we discuss the existence of non constant periodic solutions for non autonomous second order delay differential equations. Simple sufficient conditions are provided that enable us to obtain non constant periodic solutions. Our approach is based on a variational method.

Keywords and phrases SONATRACH; Stock management; ABC-XYZ analysis; Safety stock; Stockout; Instrumentation; Item availability.

TOPIC : Control \mathcal{E} Dynamical systems

Stability of an oscillated solutions for a delayed Nicholson Blowflie's equation with nonlinear Stepanov pseudo almost periodic harvesting term

Mesbah Chebab and Fatiha Boulahia

Laboratory of applied mathematics université of Bejaia Targa Ouzemmour 06000 Bejaia, ALGERIA.

— Abstract -

In this paper, an Nicholson's blowflies model with a nonlinear harvesting term and Stepanov pseudo almost periodic coefficients is investigated. By applying Banach fixed point theorem and the properties of Stepanov pseudo-almost periodic functions, we establish the criteria for the existence of the pseudo almost periodic solutions. Finally, by introducing a suitable Lyapunov functional, we obtain the global exponential stability of solutions. These results are a generalization of many works in the literature.

Keywords and phrases Stepanov pseudo almost periodicity; Nicholson equation; Banach fixed point theorem; Nonlinear harvesting term; Population dynamics; Lyapunov stability.Received before September 15, 2024. Accepted October 3, 2024.

A New Multi-spiral Hyperchaotic system Generating by Transformation without Equilibrium points with Hidden and Coexisting Attractors

<u>Faiza Zaamoune</u>

University Mohamed Khider Biskra El Alia Nord Biskra. ALGERIA.

— Abstract –

Numerous non-traditional chaotic systems have been identified in recent years, some of which do not possess an equilibrium state. This system can display a complex and intricate configuration of several spirals in a disordered condition. The aim of this study is to examine a new multi-spiral hyperchaos within the Sport system, produced by a transformation process. This system exhibits not just its complex multi-spiral hyperchaotic characteristics but also other intriguing features. Furthermore, mathematical investigations and numerical simulations reveal the presence of both coexisting and hidden attractors.

Keywords and phrases Multi-spiral; hyperchaos system; transformation; hidden coexisting. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Control $\underset{\star\star\star}{\&}$ **Dynamical systems**

A hybrid method for variational inequalities over fixed point sets of multimaps

Meddahi Meryem

Faculty of Technology. University of Hassiba Benbouali. ALGERIA.

— Abstract –

The purpose of this paper is to introduce an iterative scheme based on the viscosity approximation method for finding a solution of variational inequality problems over the fixed points set of demicontractive multimaps. Then, we prove the strong convergence of the iterative scheme to find a unique solution of the variational inequality. We provide an application to convex minimization over fixed point sets of multimaps.

Keywords and phrases Conjugate method; convex minimization, demicontractive multimap; fixed point; variational inequality.

Received before September 15, 2024. Accepted October 3, 2024.

Inverse problem of a dynamic system

Nouri Naima, Goubi Mouloud and Oukacha Brahim

Laboratoire de Recherche Opérationnelle et de Mathématiques de la Décision (LAROMAD). Mouloud Mammeri University of Tizi-Ouzou. Algeria

— Abstract -

The theory of optimal control analyzes the properties of dynamic systems on which one can act by means of a command. The purpose of this command is to bring back the object of the initial position $x(0) = x_0$ in the set $G_0(\text{start set})$ to the terminal position $x(t_*) = x_*$ within the set of end-destination sets. The linear dynamic system is described by the equation $\dot{x} = Ax + Bu$, $x(0) = x_0$ this type of linear state equation allows to represent the dynamic behavior of a process in a field of operation. Here, $x(t) = (x_j(t), j \in J)$ is a *n* vector representing the state of the system at the moment $t \in T$, x_0 the initial position, *A*, *B* of the $n \times n$, $n \times m$ constant matrix. our work consists of determining the theorem that describes the relationship between the matrices *A*, *B*, the vector *u* and the solution x(t) in a linear dynamical system $\dot{x} = Ax + Bu$ of an optimal control problem and how the matrix *A* can be found as a function of x(t).

Keywords and phrases linear dynamic system; optimal control; differential system; solution. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Control \mathcal{B} **Dynamical systems**

A Novel Fractional-Order Chaotic Memristive System and its Analysis

Lamia Chouchane, Hamid Hamiche, Karim Kemih and Achour Ouslimani Université Mouloud Mammeri 15000 Tizi-Ouzou ,ALGERIA.

— Abstract –

In recent decades, researchers have focused on chaotic systems and have increasingly attracted their interest. More specifically, chaotic systems based on memristors, which constitute the 4^{th} essential component added to resistors, capacitors, and inductors, have attracted even more attention from scientists du to their propreties. In this paper, we propose a new memrestive chaotic

system of fractional-order. To investigate the dynamic propreties of the proposed system, through analysis was conducted on its esuilibrium points and their stability. To scrutinize the performance of the showcased model, the Lyapunov characteristic exponents and the bifurcation diagram were given.

Keywords and phrases Memristor; chaotic system; fractional-order; dynamical analysis Received before September 15, 2024. Accepted October 3, 2024.

A P-Laplacian Fractional Multi Point Boundary Value Problem: Existence Of Solutions And Positive Solutions

Soumia BELARBI

USTHB of Algiers, ALGERIA.

— Abstract –

In this paper, we present new existence results for a multi-point boundary value problem involving nonlinear differential equations with Caputo fractional derivatives and a ϕ -Laplacian operator. Additionally, we establish the existence of three positive solutions for the problem using the Leggett-Williams fixed point theorem. To demonstrate the practical relevance of the second result, we provide an illustrative example.

Keywords and phrases Caputo derivative, fixed point, Leggests-Williams. Received before September 15, 2024. Accepted October 3, 2024.

Backstepping control based on first-order sliding mode extended state observer for nonlinear systems with uncertainties

Sofiane Alouane, Nadia Djeghali, Mammar Bettayeb and Ahcene Hamoudi

Laboratoire de Conception et Conduite des Systèmes de Production. Mouloud Mammeri University of Tizi-Ouzou, ALGERIA.

— Abstract -

In this paper, a backstepping control using a first-order sliding mode extended state observer is proposed to control nonlinear systems in presence of uncertainties. In the proposed control scheme, the uncertainties are estimated in finite time by a first-order sliding mode extended state observer and a backstepping control law using the estimated uncertainties is developed to garantee the convergence of the states to the desired trajectories and enhance the rejection performance to uncertainties. The proposed control scheme is applied to the Genesio chaotic system to eliminate the chaos phenomenon.

Keywords and phrases Backstepping control; first-order sliding mode extended state observer; nonlinear systems; uncertainties.

***_

Received before September 15, 2024. Accepted October 3, 2024.

Bifurcation analysis and dynamical systems

Chabane Bedjguelel and Hacene Gharout

laboratoire des mathématiques appliquée Universite de Bejaia, ALGERIA.

— Abstract -

In this paper, we study a new Beverton-Holt model that depends on four parameters and includes an Allee effect. A complete analysis of the existence and stability of the fixed points has been established. The role of the Allee parameter as a bifurcation parameter and its impact on the dynamics of the model are analyzed .

Keywords and phrases Fixed point, Stability, Allee effect, Bifurcation. Received before September 15, 2024. Accepted October 3, 2024.

Boundary stabilization for a coupled system of wave equations under fractional damping

Rachid Benzaid

Laboratory of Analysis and Control of PDEs. Djillali Liabes University, Sidi Bel Abbes, ALGERIA.

— Abstract –

In this communication ,we consider a system of a coupled wave equations in the presence of a boundary control of fractional derivative type. We prove well-posedness by using the semigroup theory. Also we establish an optimal decay result by frequency domain method and Borichev-Tomilov theorem.

Keywords and phrases System of a coupled wave equations; Fractional boundary feedbacks; Frequency domain method; Optimal polynomial stability.

Received before September 15, 2024. Accepted October 3, 2024.

_* * * _

Characterization of weak invariance with respect to differential inclusions with time-dependent maximal monotone operators

Dib Karima and Azzam-Laouir Dalila

University of Jijel, 18000 Jijel, ALGERIA.

— Abstract –

The objective of the present work is to give a characterization in finite dimensional setting, for closed sets $S \subset \mathbb{R}^d$, to be weak invariant with respect to a differential inclusions governed by time-dependent maximal monotone operators and multi-valued perturbation. In this work, the weak invariance criteria will be expressed by the use of the corresponding Hamittonian.

Keywords and phrases Hamiltonian, invariant sets; viability; maximal monotone operator; proximal normal cone; pseudo-distance.

Decay result of the Timoshenko system with a fractional memory operator

Messikh Chahrazed and soraya Labidi

Laboratory of Applied Mathematics, Badji Mokhtar University, Annaba, ALGERIA.

— Abstract -

In this work, we consider a porous system with a fractional operator in the memory term acting only on one equation of the system. The polynomial decay result is proved for case of equal speed wave propagation in addition to some suitable conditions on the relaxation function and the initial data.

Keywords and phrases Timoshenko system, Polynomial Decay, Fractional operator, Memory term; Relaxation function

Received before September 15, 2024. Accepted October 3, 2024.

Degenerate sweeping process with an integral perturbation

_* * * ___

Mouchira Mansour, Kecis Ilyas and Haddad Tahar

University of jijel, ALGERIA.

— Abstract —

The purpose of this paper is to treat a new variant of the degenerate sweeping process where the operator within the sweeping process is a set valued maximal monotone operator, and the perturbation is an integral forcing term with an integrand depending on two time variables. The normal cone of the positively alpha-far moving sets is moving in a Lipschitz continuous way. Our aim is to prove the existence of solutions By using a Moreau-Yoshida regularization method.

Keywords and phrases Degenerate sweeping process; maximal monotone operator; regularization method; differential inclusion; variational analysis.

TOPIC : Control & Dynamical systems

Direct method for solve fractional linear optimal control problems

Mohamed Aliane and Nacima Moussouni

Laboratoty LaMA, Department of Mathematics and Computer Science. University of Medea, ALGERIA.

— Abstract –

This paper presents a numerical scheme for fractional linear optimal control problems (FLOCPs) in terms of Caputo fractional derivatives (CFDs) of order $0 < \alpha \leq$ 1. We transform the fractional linear optimal control problem into a linear programming problem (LPP). In order to study the efficiency and the accuracy of

the proposed approach, we have developed some numerical experimentations with MATLAB. Our method is proved to be simple to implement and simulations demonstrate the effectiveness of the proposed method and the results obtained were illustrated by numerical example.

Keywords and phrases Caputo fractional derivatives; fractional optimal control; linear programming; simulation. Received before September 15, 2024. Accepted October 3, 2024.

Existence and stability results for laminated beam with Thermo-Visco-Elastic effect and a time varing delay term

Khalili Zineb and Djamel OUCHENANE

Laboratory of Pure and Applied Mathematics, Amar TELIDJI University, Laghouat, ALGERIA.

— Abstract -

In this study, we investigate a one-dimensional thermoelastic laminated beam system with a time-varing delay term in the internal feedback and viscoelastic dissipation on the effective rotation angle and through heat conduction in the interfacial slip equations. Under minimal conditions on the relaxation function and the relationship between the coefficients of the wave propagation speed of the first two equations, we show that the solution energy has an explicit and optimal decay rate from which the exponential and polynomial stability are just particular cases. Moreover, we establish a weaker decay result in the case of non-equal wave of speed propagation and give some examples illustrate our results.

Keywords and phrases Optimal decay, Laminated beam, thermoelasticity, viscoelasticity, convexity Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Control & Dynamical systems

* * *

Existence theorem for differential inclusions involving time and stat dependent maximal monotone operators with an integral perturbation added to an unbounded set-valued perturbation

Amira Makhlouf and Dalila Azzam-Laouir

Laboratoire LAOTI, Mohammed Seddik Benyahia university of Jijel, ALGERIA.

— Abstract -

In this work, we focus on a class of evolution problems involving time- and state-dependent maximal monotone operators in a separable Hilbert space, with integral perturbations and unbounded set-valued perturbations. We establish an existence theorem

 $\label{eq:Keywords and phrases} \ \mbox{Absolutely continuous; maximal monotone operators; pseudo-distance; integral perturbation}$

Received before September 15, 2024. Accepted October 3, 2024.

Exponential stabilization of the full von Kármán beam by a thermal effect and distributed delay

Ibrahim Daamech and Ali KERLIFA

Université de Djilali Bounaama Khemis Miliana. ALGERIA.

— 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. Published under license by AIP Publishing .

Keywords and phrases Well-Posedness, General Decay, infinite memory. Received before September 15, 2024. Accepted October 3, 2024.

Finding the optimal control of min-max linear systems with bounded constraints

Daya Ouidja, Mohamed Aidene and Karim Hamid L2CSP. Mouloud Mammeri University of Tizi-Ouzou. ALGERIA.

— Abstract —

In the present work, we are going to use a new approach of the support method for solving the min-max optimal control problem. It consists of finding the maximum of the minimum of the quality criterion where the variables and constraints are bounded. The main idea consists of three stages. First, we transform the continuous optimal control problem into an optimization (linear programming) problem using the Cauchy discretization technique. The second stage is intended for finding a nonsmooth approximation of the solution by solving this linear programming problem with the support method. At the third and final stage, the finishing procedure allows us to find the optimal solution to our problem. This is done by solving a system of nonlinear equations using the Newton method. This allows us to determine the switching times that enable us to form the optimal bang-bang control shape. This procedure is described in detail using a numerical example.

Keywords and phrases Min-max optimal control problem; Optimality estimate; Discretization; Support method; Finishing procedure.

***_

Received before September 15, 2024. Accepted October 3, 2024.

LMI conditions for observer-based stabilization of linear discrete time systems with parameters uncertainties.

<u>Cherifa Bennani</u>

LMPA. Mouloud Mammeri University of Tizi-Ouzou, ALGERIA.

— Abstract –

Linear matrix inequality (LMI) is provided for the H_{∞} observer based stabilization of a class of linear discrete time systems with parameter uncertainties. the observer and controller gains are computed simultaneously by solving only one inequality. Using Lyapunov

theory, matrix decomposition and the Young relation, we obtain a novel sufficient synthesis condition which is expressed in terms of LMI. The approach used is inspired from the classical two steps method.

Keywords and phrases Observed based stabilization, H_{∞} control, LMIS, two steps method. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Control & Dynamical systems

Modulating function-based fast convergent observer for the Coupled Tanks system.

Bahia Hadj Ali, Ania Adil and Fazia Bedouhene

Laboratoire de Mathématiques Pures et Appliquées. Mouloud Mammeri University of Tizi-Ouzou, ALGERIA.

— Abstract —

In this research, we apply the observer approach introduced by Djennoune et al. [1] to estimate water levels in a coupled tanks system. Central to this approach is the use of a remarkable modulating function based transformation T_n , which employs a time/output dependent coordinate transformation. This transformation converts the original system into a form where the effects of initial conditions are effectively nullified. The primary advantage of utilizing the T_n transformation is its ability to achieve instantaneous convergence, ensuring both rapid and accurate state estimation. The observer's finite-time convergence is assured, with the estimation error remaining bounded within a finite period. Numerical simulations further validate the effectiveness of this method for the Coupled Tanks system, demonstrating the robustness of the T_n transformation in practical applications.

Keywords and phrases Observer design; modulating function; estimation error; Coupled Tanks system Received before September 15, 2024. Accepted October 3, 2024.

Solving a PDE-constrained optimization problem and control constraints using the nonsmooth Newton method

Souheyla Zelmat, Boubakeur Benahmed and Djillali Bouagada

ACSY Team-Laboratory of Pure and Applied Mathematics, P. O. Box 227 University of Abdelhamid Ibn Badis, Mostaganem, 27000, ALGERIA.

— Abstract -

We first, apply a scalarization technique to the objective function. Then, we discretize it using the discontinuous Galerkin(DG) method in space and the Euler method in time. In the second part, we give the optimality system for the discretized optimal control problem which contains equations and complementarity conditions. Like the Fischer-Burmeister function which reformulates our equations into an on-smooth system. At the end, numerical examples are presented to illustrate the performance of our methods.

Keywords and phrases Convection-diffusion equation, discontinuous Galerkin method, Euler method, complementarity conditions, nonsmooth Newton method.

TOPIC : Control & Dynamical systems

Null Controllability of a coupled parabolic-elliptic system in the presence of singularities

Dalila Sadali and Mohamed Said Moulay

Faculté des sciences. Mouloud Mammeri University. 15000. Tizi Ouzou. Laboratoire AMNEDP, Faculté de Mathématiques. B.P. 32, El Alia, Bab Ezzouar, 16111 Alger, ALGERIA.

— Abstract -

The objective of this work is to study the controllability of a coupled system of parabolic-elliptic equations with mixed boundary conditions. The proof of the existence of such controls can be obtained by establishing an appropriate observability inequality obtained by using Carleman estimates.

Keywords and phrases Parabolic-elliptic system; controllability; observability; singularities. Received before September 15, 2024. Accepted October 3, 2024.

Observer Design for Discrete-Time Nonlinear Systems by Using A State Augmentation Approach

Fariza Rezki and Mohamed Aidene

L2CSP. Université Mouloud Mammeri de Tizi Ouzou, 15000 Tizi-Ouzou, ALGERIA.

— Abstract -

This note deals with observer design for nonlinear Lipschitz systems in discrete-time case. A general new result is proposed to improve the design methods existing in the literature based on Linear Matrix Inequality (LMI) based approach. The proposed method allows overcoming the necessary conditions required by existing techniques in the literature, namely the constraint on the Lipschitz constant of the nonlinearity of the system which needs to be less than one. To avoid this constraint, a novel state augmentation technique is provided.

Keywords and phrases Observers design, Lipschitz systems, LMI approach, discrete-time systems. Received before September 15, 2024. Accepted October 3, 2024.

On the energy behavior of strings with time-varying length and boundary damping

Abdelmouhcene Sengouga and Seyf Eddine Ghenimi

Laboratory of Functional Analysis and Geometry of Spaces. University of M'Sila. ALGERIA.

— Abstract -

We investigate the behavior of a damped string undergoing small vibrations, where the string's length changes over time. The system is described by a wave equation within a time-dependent interval $(0, \ell(t))$, with the string's endpoint moving at a velocity that satisfies $|\ell'(t)| < 1$. Our analysis yields an exact solution using a series representation, which enables us to establish both upper and lower bounds for the string's energy. These bounds are characterized by explicit constants that depend on the damping factor and $\ell(t)$.

Keywords and phrases Wave equation, time-dependent domains, generalized Fourier series, boundary stabilization.

Received before September 15, 2024. Accepted October 3, 2024.

Optimal control of Cocoa Black pod disease: A multipronged approach

Adebayo Adeniran, Onanaye Adeniyi Samson and Adeleke Olawale Joshua Department of General Studies, Federal Polytechnic, Ile-Oluji. Nigeria.

— Abstract

Cocoa black pod disease, caused by the oomycete Phytophthora megakarya, poses a significant threat to global cocoa production. This study explores optimal control strategies to minimize the impact of this devastating disease by employing a mathematical modeling approach based on Pontryagin's Maximum Principle on the model of [1]. The study investigated the combined effect of three key control interventions: infected pod removal, fungicide application, and fostering a healthy environment. Using numerical simulations, we optimize the timing and intensity of each intervention to minimize the total number of infected pods over a defined time horizon. Combining all three control strategies demonstrates the greatest effectiveness in suppressing disease severity compared to solely relying on individual interventions.

Keywords and phrases black pod; cocoa; Hamiltonian; optimal control; pontryagin's maximum principle. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Control & Dynamical systems

Proportional-Integral-Funnel Control for Mass on Car System

<u>Ahcene Hamoudi</u>, Nadia Djeghali, Sofiane Alouane and Maamar Bettayeb L2CSP, Mouloud Mammeri University of Tizi-Ouzou, ALGERIA.

— Abstract –

This paper introduces a novel controller, the PIFunnel, which combines the Funnel controller with a Proportional-Integral (PI) controller. The PI-Funnel controller is designed to achieve two key objectives: ensuring that the tracking error remains within a specified performance funnel and enhancing steady-state accuracy through the integration of the PI controller. The effectiveness of this new controller is demonstrated through simulations of a mechanical system with a higher relative degree, such as a mass-spring system mounted on a car. Comparative analysis with other control strategies validates the superior performance and efficiency of the proposed PI-Funnel control.

Keywords and phrases Funnel Control; PI controller; funnel control with feedback derivative; Mass on Car System.

Received before September 15, 2024. Accepted October 3, 2024.

Ricci Soliton of Four Dimensional Damek-Ricci spaces

<u>Noura Sidhoumi</u>

École Nationale Polytechnique d'Oran Maurice Audin Oran, ALGERIA.

— Abstract -

In this paper, we show that the four-dimensional Lorentzian Damek-Ricci spaces are not Ricci soliton. This is a generalization of a result of Tan and Deng (see [10]) who proved that these spaces are not Ricci soliton only with respect to left-invariant vector fields.

Keywords and phrases Damek-Ricci spaces; Ricci soliton; left-invariant metrics; Lorentzian metrics. Received before September 15, 2024. Accepted October 3, 2024.

TOPIC : Control & Dynamical systems

Second-Order Integro-Differential Equation: Existence and Controllability Results

Abdelhamid Bensalem

Sidi Bel Abbes University, Algeria.

— Abstract -

The objective of this work is to explore the existence of mild solutions for second-order functional semilinear integro-differential equations with infinite delay by employing a fixed point theorem grounded in measures of non compactness. Following this, we examine the approximate controllability using the controllability operator and its corresponding resolvent operator. An example is included at the conclusion to demonstrate the results achieved.

Keywords and phrases Approximate controllability; Mild solution; fixed point theorem; infinite delay; second order integro-differential equation; measures of non compactness; resolvent operator. Received before September 15, 2024. Accepted October 3, 2024.

Algebra of generalized tempered ultradistributions of Roumieu type.

<u>Ghorab El Houari</u>

Université Mustapha Stambouli, Mascara. ALGERIA.

— Abstract –

The aim of this communication is to introduce and to study a new classes of generalized functions of Colombeau type containing the space of tempered ultradistributions for this we are going to recall the definition of Simplifed Colombeau algebra and the embedding of space of distributions in this algebra, then give the definition of the space of ultradistribution, f inely we give the definition of the algebra of tempered ultradistribution.

Keywords and phrases colombeau generalized functions; ultradistribution; tempered ultradistribution. Received before September 15, 2024. Accepted October 3, 2024.

Existence and stability results for laminated beam with Thermo-Visco-Elastic effect and a time varing delay term.

Khalili Zineb, Djamel OUCHENANE

Amar Telidji University, Lagouat. ALGERIA.

— Abstract –

In this study, we investigate a one-dimensional thermoelastic laminated beam system with a time-varing delay term in the internal feedback and viscoelastic dissipation on the effective rotation angle and through heat conduction in the interfacial slip equations. Under minimal conditions on there laxation function and the reationship between the coefficients of the wave propagation speed of the first two equations, we show that the solution energy has an explicit and optimal decay rate from which the exponential and polynomial stability are just particular cases. Moreover, we establish a weaker decay result in the case of non-equal wave of speed propagation and give some examples illustrate our results.

Keywords and phrases Optimaldecay; Laminatedbeam; thermoelasticity; viscoelasticity; convexity Received before September 15, 2024. Accepted October 3, 2024.

_* * * ____

Over Mahonian numbers and log-concavity

Ali Kessouri and Moussa Ahmia

LMFN Laboratory Department of Mathematics, University Farhat Abbas -Setif 1. ALGERIA.

— Abstract -

In this paper, we introduce the concept of the "Over-Mahonian number," which represents the number of permutations of length n with k overlined inversions. We explore its properties and provide combinatorial interpretations through lattice paths, overpartitions, and tilings. Additionally, we present a combinatorial proof that these numbers form a log-concave.

Keywords and phrases Overpartitions ; Mahonian numbers ; Over Mahonian numbers ; Log ; concavity Received before September 15, 2024. Accepted October 3, 2024.

***_

Biharmonic curves in the 4-dimensional geometry

Mansour Belarbi

Abdelhamid Ibn badis University of Mostaganem. ALGERIA.

— Abstract –

In this paper, we study harmonic and biharmonic curves in Nil³ × \mathbb{R} space and $Sl_2(\mathbb{R}) \times \mathbb{R}$ space. We have obtain sufficient and necessary conditions to be

biharmonic of a curves in the Nil³ × \mathbb{R} space and Sl $Sl_2(\mathbb{R}) \times \mathbb{R}$ space.

Keywords and phrases harmonic curves; $\operatorname{Nil}^3 \times \mathbb{R}$ space; $Sl_2(\mathbb{R}) \times \mathbb{R}$ space. Received before September 15, 2024. Accepted October 3, 2024.

Solving Outer-Independent Double Roman Domination Problems

Abdelhak Omar and Ahmed Bouchou

University of Blida1. ALGERIA.

— Abstract -

An outer-independent double Roman dominating function (OIDRDF) on a graph G is a function $f: V \rightarrow 0, 1, 2, 3$ satisfying the condition that every vertex u for which f(u) = 0 is adjacent to at least one vertex v for which f(v) = 3 or two vertices v_1 and v_2 for which $f(v_1) = f(v_2) = 2$, and every vertex u for which f(u) = 1 is adjacent to at least one vertex v for which $f(v)^2$, and all vertices labeled by 0 are an independent set. The weight w(f) of an OIDRDF f is the value $w(f) = \sum_{u \in V} f(u)$. The minimum weight of an OIDRDF on G is called the outer independent double Roman domination number of G, denoted by $\gamma oidR(G)$. In this article, we continue the study of the outer-independent double Roman domination number and answer the problems posed by Ahangar et al. (2020). It is worth noting that these problems also appear in the recent paper on double Roman domination [see D. R. Poklukar and J. Žerovnik (2023)].

Keywords and phrases Double Roman domination ; outer independent double Roman domination number ; vertex cover number.

Received before September 15, 2024. Accepted October 3, 2024.

A New Cryptosystem using Zero Knowledge Proofs.

<u>Benatmane Sara</u>, Guenda Kenza and Ben Mabrouk Anouar. USTHB, Algiers, ALGERIA.

— Abstract -

The security of information is greatly influenced by the cryptography algorithms, which use intricate mathematical formulas and logic to create effective encryption methods. It is also a sort of art that enables people to conceal their private data in the world of electronics. For the purpose of encrypting large messages in a little amount of space, DNA cryptography is the state of the art and a new growing field. Our encryption method is based on the union of modified version of Diffie-Hellman by Zero Knowledge Proof, the one-time-pad idea and the biological functions of DNA to generate symmetric key to encrypt and decrypt data. This approach is particularly effective at encrypting information, concealing text, and thwarting attacks.

Keywords and phrases Cryptography ; Information security ; Zero Knowledge Proof ; Biological Operations. **Received** before September 15, 2024. **Accepted** October 3, 2024.

Session Online $_{\star\star\star}$

Splitting Argumentation Frameworks Based on Monophonic Convexity in Graphs

Mohammed Elaroussi

Unité de Recherche LaMOS, 06000 Bejaia. ALGERIA.

— Abstract -

This paper explores the application of graph-theoretic concepts, particularly monophonic convexity, to efficiently partition argumentation frameworks. These frameworks are represented as directed graphs, where nodes correspond to arguments and directed edges indicate attacks. Based on established results in graph theory, which show a polynomial-time solution for partitioning a graph into two monophonic convex sets, we investigate how these techniques can enhance the resolution of the Credulous Acceptance problem in argumentation

Keywords and phrases Splitting Argumentation Frameworks; Monophonic convexity; Credulous acceptance. Received before September 15, 2024. Accepted October 3, 2024.

Data Modeling using Neural Networks

Ibeghouchene Aldjia and Kader Merakeb

Laboratoire de Conception et Conduite des systèmes de Production Université Mouloud Mammeri Tizi-Ouzou. Algeria.

— Abstract -

This study explores the application of neural networks for predictive modeling using a sample dataset consisting of 1080 observations. The performance of two models, a Multi-Layer Perceptron (MLP) and a Long Short-Term Memory (LSTM) network, is compared. The MLP achieved a correlation coefficient of 0.955, demonstrating strong predictive capabilities. However, the LSTM, with an R2 of 0.989, outperformed the MLP, showcasing its ability to effectively capture and model temporal dependencies. These findings underline the potential of neural networks for accurate and reliable time series forecasting.

Keywords and phrases Neural Networks ; Multi ; Layer Perceptron (MLP) ; Long Short ; Term Memory (LSTM) ; Time Series Forecasting ; Predictive Modeling ; Machine Learning ; Temporal Dependencies ; Model Performance Evaluation

Calculation of Weibull parameters and function density simulation in region of Saida, (Algeria).

Toufik Sahabi

University of Saida BP 138 cité ENNASR 20000, Saida. ALGERIA.

— Abstract –

In this research, we explored two methods for assessing the wind energy potential in the Saida region for the possible installation of wind turbines. The first method involved a computational approach using wind speed measurements from the year 2023. We calculated the Weibull shape parameter k and scale parameter c using the graphical representation method of the partition function (or cumulative frequencies). Additionally, we simulated wind speeds over 8760 hours for the year 2023. The simulated results closely matched the experimental data, providing further insights and predictions.

Keywords and phrases Weibull parameters ; Monte Carlo simulation ; Wind turbine ; Cumulated frequencies. Received before September 15, 2024. Accepted October 3, 2024.

Multiobjective Traveling Salesman Problem: An exact Approach.

Asma BOUMESBAH, Mohamed El-Amine CHERGUI, Lysa IAMRACHE

University of Sciences and Technology Houari Boumediene, BP 32 EL Alia 16111 Bab Ezzouar, Algiers, Algeria.

— Abstract –

The objective of this study is to develop an exact method capable of generating the efficient set for the Multi-Objective Traveling Salesman Problem (MTSP) using a branch-and-bound framework. This method ensures the construction of only efficient Hamiltonian cycles for TSP instances with more than two objectives. The branching process is based on identifying edges shared by at least two non-Hamiltonian cycles within the graph. Through this, linear constraints are iteratively formulated to eliminate cycles while maintaining the graph's connectivity. The graph is then partitioned into sub-graphs, each corresponding to a distinct multiobjective linear program aimed at identifying the set of non-dominated Hamiltonian cycles.

Keywords and phrases Traveling Salesman Problem ; Multiobjective optimization ; Branch and Bound. Received before September 15, 2024. Accepted October 3, 2024.

Fractional Stochastic Differential Equation Model for Disease Dynamics

Khelifa Berkane, Omar Kebiri and Abdeldjebbar Kandouci

Dr. Moulay Tahar University of Saida, P.B 138 Ennasr 20000, Saida. ALGERIA.

— Abstract -

The purpose of this paper is to study the dynamics of a stochastic SIRDS epidemic model and formulate the model as a fractional stochastic differential equation (FSDE, in short) driven by a fractional Brownian motion with Hurst index $H \in (\frac{1}{6}, \frac{1}{2})$. We prove the existence and uniqueness of the global positive solution using the Itô formula and random Lyapunov function theory. The sufficient conditions for disease extinction are obtained.

 $\label{eq:keywords} \begin{array}{l} {\sf Keywords \ and \ phrases \ stochastic \ SIRDS \ model \ ; \ fractional \ Brownian \ motion \ ; \ symmetric \ integral \ ; \ existence \ and \ uniqueness \ ; \ extinction \end{array}$

Received before September 15, 2024. Accepted October 3, 2024.

Evaluation of Lax-Friedrichs and MacCormack Numerical Schemes in Dam Break Simulation Using Saint-Venant Equations.

Taous Douali, Hassina Arroudj, Fatah Bouhmila.

Laboratoire de Recherche Opérationnelle et de Mathématiques de la Décision. Mouloud Applied Mathematics Laboratory, University of Abderrahman Mira, Béjaia. ALGERIA.

— Abstract -

In this study, two explicit schemes of Lax-Friedrichs and McCormack are used to simulate the dam break wave problem. In order to improve the results of numerical simulation, we performed a comparative study of these two schemes; these comparisons allow us to choose the numerical method suitable for the simulation of the dam break wave. The results are presented in one space dimension.

Keywords and phrases Saint-Venant ; dam break ; Lax-Friedrichs scheme ; MacCormack scheme. Received before September 15, 2024. Accepted October 3, 2024.

Stochastic Analysis of an SEIR Model for Measles with Saturation Recovery Rate and Ornstein-Uhlenbeck Process

Mhammed Mediani, Abdeldjalil Slama, Ahmed Boudaoui, Abdeldjalil Kadri

Laboratory of Mathematics, Modeling and Applications (LaMMA), University of Adrar, Adrar University of Adrar, Adrar. ALGERIA.

— Abstract -

In our study, we formulated a stochastic model to represent the complex transmission dynamics of measles. We began by proving the existence and uniqueness of a global positive solution for the stochastic system. Using the Lyapunov function method, we demonstrated the existence of a stationary distribution for the positive solution, provided the stochastic reproduction number $R_0^s > 1$. This result is crucial as it suggests the potential persistence of the disease in a biological setting. Additionally, we derived sufficient conditions for the extinction of the disease. To reinforce our theoretical results, we performed numerical simulations, which helped to confirm the analytical outcomes and explore the effects of stochastic fluctuations on disease transmission

Keywords and phrases Measles model ; Ornstein–Uhlenbeck process ; Stationary distribution ; Extinction Received before September 15, 2024. Accepted October 3, 2024.

Restricted Stirling numbers and chromatic polynomial.

Abdelghani Mehdaoui, Hacène Belbachir and Amine Belkhir

NHSM National Higher School of Mathematics, P.O.Box 75, Mahelma 16093, Sidi Abdellah. ALGERIA.

— Abstract –

We introduce a new restriction on the Stirling numbers of second kind, we give the recurrence relation polynomia

Keywords and phrases Set partitions ; Stirling numbers ; recurrence relations ; chromatic polynomial ; cycle graph.

Exact method for the bi-objective portfolio selection problem with risk-free asset.

Boudjelda Souhaib, Brahmi Belkacem

Unité de recherche Laboratoire de Modélisation et Optimisation des Systèmes, Université de Béjaïa. ALGERIA.

— Abstract -

In recent years, portfolio optimization theory has attracted increasing interest among researchers, due to its crucial contribution to investment decision-making and financial risk management. In this work, we present a new parametric method for solving the Markowitz Mean-Variance model with a risk-free asset. The proposed algorithm allows to iteratively determine all the pivot points associated with the corner portfolios of the problem. Thus, it allows to fully drawing the efficient frontier, as well as plotting the capital market line.

Keywords and phrases Portfolio selection problem ; support method ; efficient frontier ; capital market line ; parametric quadratic programming.

Received before September 15, 2024. Accepted October 3, 2024.

Simulation of a Web services discovery and composition system

Bernine Nassima and Aissani Djamil

Unité de Recherche LaMOS, Département Recherche Opérationnelle, Béjaïa. ALGERIA

— Abstract

A Web service designates a new type of software component having the capacity to publish its functions on the Internet in the form of services, and to make these services easily invocable and to make them available to clients through standard Internet protocols. In this work, we modeled a system of simple and composite Web services and evaluated the performances. First we proposed a model based on colored Petri nets with synchronization of two queues, the first represents the Web services and the second represents the requests of the clients, the Web services and the clients are defined by colors. Performance was evaluated using a special "Colored Petri Nets Tools (CPN Tools)" simulator for colored Petri nets where we determined the average number of clients, average number of Web services and average number of clients served.

Keywords and phrases Web services ; Performance evaluation ; Colored Petri net ; CPN Tools simulator. Received before September 15, 2024. Accepted October 3, 2024.

Decay result of the Timoshenko system with a fractional memory operator

Messikh Chahrazed and soraya Labidi

Laboratory of Applied Mathematics, Badji Mokhtar University, Annaba, ALGERIA.

— Abstract –

In this work, we consider a porous system with a fractional operator in the memory term acting only on one equation of the system. The polynomial decay result is proved for case of equal speed wave propagation in addition to some suitable conditions on the relaxation function and the initial data.

 ${\sf Keywords}$ and phrases Timoshenko system, Polynomial Decay, Fractional operator, Memory term; Relaxation function

Received before September 15, 2024. Accepted October 3, 2024.

A Case Of Recurrence In The Absolute Difference Chains With Heavy Tailed Increments.

_____***_____

Sabira Ben Alia and Mohammed Hachama

Laboratory of AMNEDP, Departement of mathematics, 6 B.P. 32, El Alia, Bab Ezzouar, 16111 Alger. ALGERIA.

— Abstract –

In this work, we propose a new model for image fusion in which we combine a fidelity term on a subregion with a nonlocal poisson equation. Our model is based on nonlocal differential operators to exploit the similarities between nonlocal distant pixels and regions. Experimental results show that the proposed model achieves state-of-the-art performance in term of visual quality

Keywords and phrases Image fusion ; Poisson equation ; Nonlocal differential operators ; Energy minimization. Received before September 15, 2024. Accepted October 3, 2024.

The Dimer Model: Analyzing the Connection Between Flips and Cycle transformations

Walid Abdelaidoum and Hacéne Belbachir

Université des Sciences et de la Technologie Houari Boumediene BP 32 EL Alia 16111 Bab Ezzouar. ALGERIA.

— Abstract –

In this paper, we investigate the relationship between cycles defined by Kasteleyn's orientation [4] in the dimer model and the flips or elementary operations that involve two dimers. The dimer model, which arises in the study of perfect matchings on graphs, provides a rich combinatorial structure that has applications in condensed matter physics and statistical mechanics. We focus on the minimum number of flips required to transition between distinct dimer cycle configurations. Through our analysis, we establish a quantitative relation between Kasteleyn cycles and dimer flips. Our results contribute to a deeper understanding of the structural properties and dynamics of the dimer model, with implications for both theoretical and computational approaches to statistical mechanics.

Keywords and phrases Dimer ; model ; cycle ; graph ; flip ; grid Received before September 15, 2024. Accepted October 3, 2024.

Variational method for delay differential equations.

Fatima Dib, Mustapha Yebdri and NaimaDaoudi-Merzagui

University centre of Maghnia, ALGERIA.

— Abstract –

In this paper we discuss the existence of non constant periodic solutions for non autonomous second order delay differential equations. Simple sufficient conditions are provided that enable us to obtain non constant periodic solutions. Our approach is based on a variational method.

Keywords and phrases SONATRACH; Stock management; ABC-XYZ analysis; Safety stock; Stockout; Instrumentation; Item availability.

Fractional differential equations on closed sets.

Habib Ameur and Omar Benniche

Department of Mathematics, Djilali Bounaama University, Khemis-Miliana. ALGERIA.

— Abstract -

We consider the viability problem for a fractional differential equation of the form $D_{t_0}^q y(t) = f(t, y(t))$ where $f: G \to \mathbb{R}^n$ is a given function, $G = [a, b) \times K$ with $K \subset \mathbb{R}^n$ and $D_{t_0}^q y$ stands for the Caputo derivative. We introduce a fractional tangency definition that characterizes a cylindrical domain viability with respect to the above fractional equation. As application, a physical system is investigated.

Keywords and phrases Viability, Fractional differential equation, Tangency condition. Received before September 15, 2024. Accepted October 3, 2024.

Log-concavity of q-Mahonian numbers

Yousra Ghemit and Moussa Ahmia

LMAM laboratory. University of Jijel Ouled Aissa, BP 98, 18000 Jijel. ALGERIA.

— Abstract –

we defined in our paper [7] a q-analogue of the number of permutations $i_m(h)$ of length m having h inversions known as Mahonian numbers. So in this work we investigate a combinatorial interpretations by lattice paths/partitions and tilings. Furthermore, we give a constructive proof of the strong q-log-concavity of the q-Mahonian numbers. In particular for q = 1, we obtain a constructive proof of the log-concavity of the Mahonian numbers.

Keywords and phrases Mahonian numbers ; inversions ; permutations ; lattice paths ; q ; log concavity. Received before September 15, 2024. Accepted October 3, 2024.

Characterization of weak invariance with respect to differential inclusions with time-dependent maximal monotone operators

Dib Karima and Azzam-Laouir Dalila

University of Jijel, 18000 Jijel, ALGERIA.

— Abstract -

The objective of the present work is to give a characterization in finite dimensional setting, for closed sets $S \subset \mathbb{R}^d$, to be weak invariant with respect to a differential inclusions governed by time-dependent maximal monotone operators and multi-valued perturbation. In this work, the weak invariance criteria will be expressed by the use of the corresponding Hamittonian.

Keywords and phrases Hamiltonian, invariant sets; viability; maximal monotone operator; proximal normal cone; pseudo-distance.

Received before September 15, 2024. Accepted October 3, 2024.

A time varying BL process: approximation and derivative

_* * * _

Karima Kimouch

Department of Mathematics, 20 august 1955 university skikda, SKIKDA. ALGERIA.

— Abstract -

In this paper, we attempt to shed light on the timevarying bilinear process. So, the class of bilinear models is generalized to the nonstationary class of bilinear models with time-varying coefficients, and it is shown that this latter can locally be approximated by stationary bilinear process. The measure of deviation from stationarity can be expressed as a function of a derivative bilinear process. This derivative bilinear process inherits many properties common to stationary bilinear processes. Moreover, a Taylor expansion of the nonstationary bilinear process in terms of stationary processes is given and it is shown that the derivative processes obtained here satisfy alpha mixing properties.

Keywords and phrases Time varying BL process ; Locally stationary process ; derivative process Received before September 15, 2024. Accepted October 3, 2024.

Approximate method for solving the dynamic multi-objective bin packing problem.

Sabrin Boulebene, Méziane AÏder, Mhand Hifi.

University of Sciences and Technology Houari Boumediene Pb 32, Bab Ezzouar, 16111 Algiers, ALGERIA.

— Abstract -

This paper addresses the dynamic multi-objective bin packing problem and focuses on optimizing the packing of cooling cookies into boxes while adhering to a specific production process. The problem is tackled using an approximate multi-objective scatter search (SS) method designed to optimize three key objectives: the number of boxes used (to minimize), the average initial heat in each box (to minimize), and the time required to move all boxes to the storefront (to minimize). The performance of the proposed method SS is validated on benchmark instances from existing literature. The numerical results demonstrate its superiority over recent approaches and underscore the method's effectiveness and potential as a competitive solution for the dynamic multi-objective bin-packing problem.

Keywords and phrases multi objective ; dynamic ; bin packing. Received before September 15, 2024. Accepted October 3, 2024.

A time varying BL process: approximation and derivative

Karima Kimouche

Department of Mathematics, 20 august 1955 university skikda SKIKDA. ALGERIA.

— Abstract –

In this paper, we attempt to shed light on the timevarying bilinear process. So, the class of bilinear models is generalized to the nonstationary class of bilinear models with time-varying coefficients, and it is shown that this latter can locally be approximated by stationary bilinear process. The measure of deviation from stationarity can be expressed as a function of a derivative bilinear process. This derivative bilinear process inherits many properties common to stationary bilinear processes. Moreover, a Taylor expansion of the nonstationary bilinear process in terms of stationary processes is given and it is shown that the derivative processes obtained here satisfy alpha mixing properties.

Keywords and phrases Time varying BL process ; Locally stationary process ; derivative process Received before September 15, 2024. Accepted October 3, 2024.

Session Online $_{\star\star\star}$

Smoothing Parameter Selection For A New Regression Estimator For Non-negative Data

Isma DEBBAH, Naâmane Laïb, Abdelkader Tatachak

Faculty of Mathematics, USTHB, Laboratory MSTD, BP 32, El-Alia, 16111. ALGERIA.

— Abstract –

In this paper, we apply the CV selection technique to the estimator proposed by Chaubey, Laib, and Sen (2010), which is a new regression estimator for nonnegative random variables. The estimator is based on a generalization of Hille's lemma and a perturbation idea. A simulation study is conducted to compare the performance of the proposed approach with other competitive methods.

Keywords and phrases Gamma kernels; Non-negative data; Regression function ; Hille's lemma. Received before September 15, 2024. Accepted October 3, 2024.

_* * * _

A New Multi-spiral Hyperchaotic system Generating by Transformation without Equilibrium points with Hidden and Coexisting Attractors

Faiza Zaamoune

University Mohamed Khider Biskra El Alia Nord Biskra. ALGERIA.

— Abstract ·

Numerous non-traditional chaotic systems have been identified in recent years, some of which do not possess an equilibrium state. This system can display a complex and intricate configuration of several spirals in a disordered condition. The aim of this study is to examine a new multi-spiral hyperchaos within the Sport system, produced by a transformation process. This system exhibits not just its complex multi-spiral hyperchaotic characteristics but also other intriguing features. Furthermore, mathematical investigations and numerical simulations reveal the presence of both coexisting and hidden attractors.

Keywords and phrases Multi-spiral; hyperchaos system; transformation; hidden coexisting. Received before September 15, 2024. Accepted October 3, 2024.

Boundary stabilization for a coupled system of wave equations under fractional damping

Rachid Benzaid

Laboratory of Analysis and Control of PDEs. Djillali Liabes University, Sidi Bel Abbes, ALGERIA.

— Abstract -

In this communication ,we consider a system of a coupled wave equations in the presence of a boundary control of fractional derivative type. We prove

well-posedness by using the semigroup theory. Also we establish an optimal decay result by frequency domain method and Borichev-Tomilov theorem.

Keywords and phrases System of a coupled wave equations; Fractional boundary feedbacks; Frequency domain method; Optimal polynomial stability.

Received before September 15, 2024. Accepted October 3, 2024.

_* * * _

Existence theorem for differential inclusions involving time and stat dependent maximal monotone operators with an integral perturbation added to an unbounded set-valued perturbation

Amira Makhlouf and Dalila Azzam-Laouir

Laboratoire LAOTI, Mohammed Seddik Benyahia university of Jijel, ALGERIA.

— Abstract -

In this work, we focus on a class of evolution problems involving time- and state-dependent maximal monotone operators in a separable Hilbert space, with integral perturbations and unbounded set-valued perturbations. We establish an existence theorem

Keywords and phrases Absolutely continuous; maximal monotone operators; pseudo-distance; integral perturbation

Session Online $_{\star\star\star}$

The New Extended Rayleigh Distribution: different estimation methods and Applications

Djahida Tilbi

University 20 August 1955 Skikda. Algeria.

— Abstract -

The New Extended Rayleigh Distribution (NERD) is an advanced statistical model designed to extend the classic Rayleigh distribution. It incorporates additional parameters to better capture the variety and characteristics of complex data sets. In this work, we propose various estimation methods: maximum like-

lihood estimation, weighted least squares, percentile and maximum product of spacing. Simulation results demonstrate that the NERD model provides a better fit to the data compared to several competing distributions.

Keywords and phrases Maximum likelihood estimation ; method of weighted least squares ; method of percentile ; method of maximum product of spacing.

Received before September 15, 2024. Accepted October 3, 2024.

Scaled Laguerre collocation method for solving high-order ordinary differential equations on the half-line.

Walid Remili

Faculty of Mathematics and Computer Science, University of M'sila. ALGERIA.

— Abstract

The aim of this work is to approximate the solution of a high-order ordinary differential equation on the half-line. The collocation method is based on the scaled Laguerre functions. At first, we describe some properties of the approximation of this function, and then, operational matrices of differentiation are given to reduce the problem to a linear algebraic equations system. Finally, we illustrate some numerical results to examine the accuracy and efficiency of the proposed method compared with other approaches.

Keywords and phrases High order ordinary differential equations; Scaled Laguerre functions; Collocation method; The half line.

Recursive kernel density estimation for positive time series under η -weak dependence

Mohamed Khemici, Nabil Zougab, Smail ADJABI

LaMOS Research Unit. Abderrahmane Mira University of Bejaia. ALGERIA.

— Abstract -

This paper investigates recursive kernel density estimation for positive time series under η -weak dependence. The mean integrated squared error (MISE) is es- tablished as a global property. A simulation study investigates the performance of some asymmetric kernel (G, IG and RIG) recursive kernel density estimators and compares their performance with the non-recursive density estimators for η -weak dependence.

Keywords and phrases Mean integrated squared error, Recursiv kernel density estimation, η weak dependence, Time series.

Received before September 15, 2024. Accepted October 3, 2024.

Well-posedness and stability results for the Korteweg-de Vries equation in bounded domain.

Mohammed Allali

Laboratory of Mathematics. University Ahmed Ben Bella oran 1. ALGERIA.

— Abstract -

In this study, our focus has been on establishing the existence and uniqueness of the solution for the nonlinear Korteweg-de Vries equation with delay and analyzing the stability of this equation with a constant delay in the boundary feedback. Exponential stability results have been demonstrated using the energy decay of the system and a Lyapunov functional.

Keywords and phrases Korteweg-de Vries equation; exponential stability; energy of system, Lyapunov functional.

Testing epidemic change in the mean of weakly dependent random variables

Hichem Elmossaoui, OUKID Nadia, Aitameur Ahmed

LAMDA-RO Laboratory, Department of Mathematics, Faculty of Sciences, University Saad Dahlab Blida1, BP 270 Soumâa, Blida. ALGERIA.

— Abstract -

This article presents a method for construction computer experiment designs based on stochastic process theory, specifically marked point processes with kmarks. The designs are generated using the Monte Carlo method through Markov Chains (MCMC) and the Metropolis-Hastings algorithm. This approach allows for great flexibility, making the designs adaptable to various objectives. Additionally, an in-depth analysis of the convergence of the Markov chains has been conducted.

Keywords and phrases Experimental designs ; Computer experiment designs ; Point processes ; Marked point processes ; Markov Chain Monte Carlo (MCMC) ; Metropolis ; Hastings algorithm. Received before September 15, 2024. Accepted October 3, 2024.

Exponential inequality and strong laws for weighted sums of widely dependent random variables and application

Omar El Farouk Cherifi, Samir Benaissa, Boubaker Mechab

statistics and stochastic processes laboratory, Djillali Liabes University of Sidi Bel Abbes BP89- ALGERIA.

— Abstract -

In this paper, we determine an exponential inequality for weighted sums of non-identically distributed widely dependent random variables, as well as establish the strong law of large numbers under the same conditions. As an application, we prove the strong consistency of the nonparametric regression model.

Keywords and phrases Widely dependence ; exponential inequality ; strong law of large numbers ; nonparametric regression model

A Comparison Between Genetic Algorithm (GA) and Ant Colony Optimization Algorithm (ACO) for Robot Mobile Path Planning

Slimani Sami, Zennir Youcef, Saib Bouthina and Femmam Manel

7 Research Laboratory LRPCSI, Université 20 Août 1955 Skikda , 21000 Skikda, ALGERIA.

— Abstract -

In our everyday lives, we encounter a wide range of problems that vary in complexity and the methods required to address them. While some issues are straightforward, others demand considerable time and effort to resolve. For these more complex problems, instead of striving for a perfect solution, we often focus on finding an optimal solution quickly through the use of optimization algorithms. This research paper aims to compare the efficiency of two different metaheuristic algorithms in solving a real-life problem: mobile robot path planning. The first algorithm is a Swarm Intelligence (SI) metaheuristic known as Ant Colony Optimization (ACO), while the second is an evolutionary algorithm known as the Genetic Algorithm (GA). The problem is first outlined with relevant definitions, followed by simulation experiments. Both algorithms are applied to solve this real-world problem, and after running each algorithm ten times, the results demonstrate that the Ant Colony Optimization algorithm is more effective than the Genetic Algorithm. The average performance of ACO was 135.138, compared to 153.035 for GA.

Keywords and phrases Meta Heuristic ; Optimization ; Ant Colony Optimizer (ACO) ; Genetic Algorithm (GA) ; Robot Mobile Path Planning Problem ; Swarm Intelligence (SI) ; Evolutionary Algorithm. **Received** before September 15, 2024. **Accepted** October 3, 2024.

_____* * * * _____

Exponential stability in the context of mild solutions for neutral impulsive functional evolution equations.

Berrighi Fatma and Medjadj Imene

Department of Mathematics, University of Mohammed Boudiaf (USTO-MB), Oran. ALGERIA.

— Abstract -

By employing Schauder's fixed point theorem, we will establish essential criteria that ensure the existence and exponential stability of mild solutions for first-order impulsive neutral functional evolution equations, governed by local conditions within a separable Banach space. To illustrate the practical application and validate the theoretical results, an example is presented, demonstrating the effectiveness of the proposed approach

Keywords and phrases Impulsive functional differential equations; mild solutions; fixed point; semigroups; separable Banach space.

Predictive Modeling of Brucellosis Outbreaks in Algeria: Comparing SARIMA, NNAR, and Hybrid Models for Accurate Forecasting

<u>Akermi Seif Eddine</u>

Laboratory L'IFORCE, Dept of Operations Research, Fac. Maths, USTHB alger. ALGERIA.

— Abstract

Brucellosis remains a significant public health concern in Algeria, characterized by endemicity and sporadic epidemics. This study aimed to provide an epidemiological overview of brucellosis in Algeria while comparing the performance of different prediction models using surveillance data from Tébessa province. Seasonal Autoregressive Integrated Moving Average (SARIMA) models, Autoregressive Neural Network (NNAR) models, and SARIMA-NNAR hybrid models were developed to forecast monthly brucellosis notifications. The predictive accuracy of these models was evaluated using metrics such as Root Mean Squared Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). The results demonstrated that $SARIMA(2,1,3)(1,1,1)_{12}, NNAR(12,1,6)_{12},$ and $SARIMA(2,1,3)(1,1,1)_{12} - NNAR(5,1,4)_{12}$ exhibited the best fit to the data. The SARIMA and SARIMA-NNAR models outperformed the NNAR model, as indicated by lower RMSE, MAE, and MAPE values. The findings suggest that SARIMA and SAR-IMANNAR models are suitable for accurately predicting human brucellosis cases. Accurate forecasts and incidence mapping of brucellosis can provide valuable support for veterinary and health policymakers in devising informed, effective, targeted strategies, and timely interventions. In conclusion, the development of robust prediction models for brucellosis outbreaks in Algeria, utilizing SARIMA, NNAR, and hybrid approaches, demonstrates their potential to enhance public health response. These models enable policymakers to make informed decisions and implement proactive measures to mitigate the impact of brucellosis outbreaks.

Keywords and phrases Epidemiology ; Time Series Analysis ; Seasonal Autoregressive Integrated Moving Average (SARIMA) ; Autoregressive Neural Network (NNAR) ; Hybrid Models ; Disease Forecasting ; Predictive Modeling

Received before September 15, 2024. Accepted October 3, 2024.

Bifurcation analysis and dynamical systems

Chabane Bedjguelel and Hacene Gharout

laboratoire des mathématiques appliquée Universite de Bejaia, ALGERIA.

— Abstract -

In this paper, we study a new Beverton-Holt model that depends on four parameters and includes an Allee effect. A complete analysis of the existence and stability of the fixed points has been established. The role of the Allee parameter as a bifurcation parameter and its impact on the dynamics of the model are analyzed .

Keywords and phrases Fixed point, Stability, Allee effect, Bifurcation. Received before September 15, 2024. Accepted October 3, 2024.

_* * * _

Organizing and Program Committees Members

Program Committee Members:

- Farida ACHEMINE, U. Tizi-Ouzou
- Farid AICHE, U.Tizi-Ouzou
- Ahmed AMIROU, U.Tizi-Ouzou
- Lynda ATIL, U.Tizi-Ouzou
- Fatima BELLAHCENE, U. Tizi-Ouzou
- Mouloud GOUBI, U. Tizi-Ouzou
- Djamel HAMADOUCHE,U. Tizi-Ouzou
- Abdelkader MERAKEB, U.Tizi-Ouzou
- Mohand OUANES, U. Tizi-Ouzou
- Brahim OUKACHA, U.Tizi-Ouzou
- Mannal SMAALI, U. Tizi-Ouzou

Organizing Committee Members:

- Kahina BEDOUHENE, U. Tizi-Ouzou
- Noria BENKHEMMOU, U. Tizi-Ouzou
- Fadila LESLOUS, U. Tizi-Ouzou
- Sabiha DJEBARA, U, Tizi-Ouzou
- Ali DJEBID, U. Tizi-Ouzou
- Mohammed CHEBBAH, U. Tizi-Ouzou
- Fatima HESSAS, U. Tizi-Ouzou
- Youcef IBAOUENE, U. Tizi-Ouzou
- Hocine KOURAT, U. Tizi-Ouzou
- Fetima LADJIMI, U. Tizi-Ouzou
- Hocine KOURAT, U. Tizi-Ouzou
- Mannal SMAALI, U. Tizi-Ouzou
- Omar MESSAOUDI, U. Tizi-Ouzou
- Hanifa MOKHTARI, U. Tizi-Ouzou
- Lynda MITICHE, U. Tizi-Ouzou
- Fariza REZKI, U. Tizi-Ouzou
- Djamel TALEM, U. Tizi-Ouzou
- Smail YOUSFI, U. Tizi-Ouzou

Scientific Club Mathematica

■ (Students), Univ. Tizi-Ouzou.

Scientific Committee

Scientific Committee

Chair : Fazia BEDOUHENE, UMMTO

Co-chair : Moussa LARBANI, ENSSEA Kolea

- Thabet ABDELJAWAD ; Univ. Prince Sultan ; Saudi Arabia
- Boumediene ABDELLAOUI ; Univ. Tlemcen ; Algeria
- Aissa AIBECHE ; Setif university ; Algeria
- Mohamed AIDENE ; UMMTO ; Algeria
- Meziane AIDER ; USTHB; Algeria
- Djamil AISSANI ; Univ. Bejaia ; Algeria
- Abdelhakim AKNOUCHE ; Univ. of Qassim ; Saudi Arabia
- Mohamed AMARA ; UPPA ; France
- Youcef AMIRAT ; Univ. Clermont Ferrand ; France
- Kaïs AMMARI ; Univ. of Monastir ; Tunisia
- Youcef ASKOURA ; Univ. Paris 2, LEMMA ; France
- Dalila AZZAM-LAOUIR ; Univ. Jijel ; Algeria
- Mourad BAIOU ; CNRS ; France
- Hacène BELBACHIR ; USTHB & CERIST; Algeria
- Belaid BENHAMOU; Univ. Aix-Marseille ; France
- Maamar BETTAYEB; Univ. Sharjah; UAE
- Abdelouahab BIBI ; Univ. Oum El Bouaghi ; Algeria
- Mohand Ouamar BIBI; Univ. Bejaia ; Algeria
- Mohamed BOUALEM; Univ. Bejaia ; Algeria
- Hamid BOULARES ; Univ-Guelma, Algeria
- Sadek BOUROUBI ; USTHB ; Algeria
- Islam BOUSSAADA; IPSA & Univ. Paris Saclay; France
- Eric BUSVELLE ; Univ. Toulon ; France
- Yacine CHITOUR; Univ. Paris-Saclay ; France
- Bernard DE BAETS ; Univ. Ghent, Belgium
- Amar DEBBOUCHE, U. Guelma, Algeria
- Boualem DJEHICHE ; KTH, Stockholm ; Sweden
- Said DJENNOUNE ; UMMTO ; Algeria
- Hocine FELLAG ; UMMTO ; Algeria
- Christian FRANCQ ; Univ. of Lille ; France
- Said HAMADENE; Univ. Le Mans ; France
- Kamel HAMDACHE ; Pôle Léonard de Vinci; France
- Fayçal HAMDI ; USTHB ; Algeria
- Mohamed IBAZIZEN; Univ. Poitiers ; France
- Fahd JARAD; U-çankaya; Turkey
- Nacima LABADIE ; UTT Troyes ; France
- Taous-Meriem LALEG-KIRATI ; KAUST ; Saudi Arabia

- Tahir MAHMOOD ; Univ. Iternational Islamic; Pakistan
- Rachid MANSOURI ; UMMTO ; Algeria
- Salim MESSAOUDI; Univ. Sharjah ; UAE
- Brahim MEZERDI; Univ. King Fahd ; Saudi Arabia
- Felix MORO-CAMINO ; UFF Rio de Janeiro; Bresil
- Naeem JAN ; National Univ. Transportation ; Korea
- Lhouari NOURINE ; Univ. Clermont-Auvergne; France
- Djaffar OULD ABDESLAM ; Univ. Haute Alsace ; France
- Yu PO LUNG ; School of Business, Univ. of Kansas ; USA
- Mohamed Said RADJEF; University of Bejaia ; Algeria
- Leila RAHMANI; UMMTO ; Algeria
- Ewa RAK; Univ. Rzeszów ; Poland
- Djamal REBAINE ; Univ. Quebec Chicoutimi ; Canada
- Biagio RICCERI; Univ. Catania ; Italy
- E Fabrizio RUGGERI; Univ. Milano ; Italy
- Yousef SAAD; Univ. Minnesota; USA
- Bachir SADI; UMMTO ; Algeria
- Djilali SALIH; Univ. Chlef; Algeria
- Lakhdar SAIS, U. d'Artois, France
- Yakoub SALHI; CRIL, Univ. LENS ; France
- Mohammed SBIHI; ENAC, Toulouse ; France
- Emmanuel TRÉLAT ; Univ. Sorbonne; France
- Abderrahmane YOUSFATE, Univ. Sidi Bel Abbès; Algeria
- Lemnaouar ZEDAM; Univ. M'sila ; Algeria
- Jun ZHOU; CAUC-Tianjin ; China
- Nabil ZOUGAB; Univ. Bejaia ; Algeria

ORGANIZING COMMITTEE

Conference Organizers and Boards

- **Honorary Chair**: Pr. Ahmed BOUDA, President of the University of Tizi-Ouzou , UMMTO, Algeria.
- **President of the Conference:** Pr. Abdelghani HAMAZ, UMMTO, Algeria.
- **President of the Organizing Committee** : Dr. Omar MELLAH, UMMTO, Algeria
- **Vice-president of the Organizing Committee** : Pr. Farida ACHEMINE, UMMTO, Algeria.
- Sponsorship Manager; Co-organizer : Pr. Brahim OUKACHA, UMMTO, Algeria Director of Laboratoire de Recherche Opérationnelle et Mathématiques de Décision (LAROMAD)
- Sponsorship Manager; Co-organizer : Dr. Mouloud GOUBI, UMMTO, Algeria Director of Laboratoire de Mathématiques Pures et Appliquées (LMPA)
- **President of the Program Committee** : Pr. Abdelkader MERAKEB, UMMTO, Algeria Head of Mathematics and Computer Science area
- Chairs of the Scientific Committee Prof. Fazia BEDOUHENE, UMMTO, Algeria.
 Prof. Moussa Larbani, ENSSEA, Pôle Universitaire de Koléa, Algeria
- **President of Mathematical Society of Algeria (SMA)** : Co-organizer, Pr. Meziane AIDER, USTHB Algeria. Founder of the MOAD Conference, Honorary
- **Member of the Organizing Committee** : Pr. Djamil AISSANI, University of Bejaia, Algeria.
- **Honorary Member of the Organizing Committee** : Pr. Hacène Belbachir, USTHB, Algeria.
- Honorary Member of the Organizing Committee : Pr. Moussa LARBANI, ENSSEA, Pôle Universitaire de Koléa, Algeria.
- Honorary Member of the Organizing Committee : Pr. Po-Lung YU , School of Business, University of Kansas, USA.
- Honorary Member of the Organizing Committee : Pr. Biagio RICCERI , University of Catania, ITALY.