THE INTERNATIONAL CONFERENCE OF
INDUSTRIAL AND APPLIED MATHEMATICS

ABSTRACT BOOK

ICoIAM 2025

Hammamet, Tunisia

19-21 December 2025

Compiled from the final conference program

Editorial Note

This volume contains only the contributions listed in the supplied final ICoIAM 2025 program. To complete the requested book in the absence of author-submitted abstract texts, the abstracts in this edition were editorially generated from the presentation titles. They are concise thematic descriptions and should not be treated as verbatim author submissions or as statements of verified experimental results. Names, titles, countries, and presentation categories follow the conference program.

Scope: 8 invited or plenary lectures, 111 oral presentations, and 87 poster presentations. Total: 206 contributions.

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Chapter 1

Invited and plenary lectures

Invited and plenary lectures

BRIDGING ALGEBRA AND NATURE: TOWARD A DEFORMABLE 3D HYPER-COMPLEX FRAMEWORK FOR MODELING DYNAMIC SYSTEMS

ABDON ATANGANA
SOUTH AFRICA

ABSTRACT

This contribution investigates bridging algebra and nature: toward a deformable 3d hyper-complex framework for modeling dynamic systems within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Invited and plenary lectures

POLYNOMIAL AND NON-EXPONENTIAL STABILITY OF A WEAK DISSIPATIVE BRESSE SYSTEM

AISSA GUESMIA
FRANCE

ABSTRACT

This work addresses polynomial and non-exponential stability of a weak dissipative bresse system from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Dynamical Systems, Control

Invited and plenary lectures

THE Q-ANALOGUES OF FRACTIONAL OPERATORS CONCERNING ANOTHER FUNCTION IN THE POWER-LAW

THABET ABDELJAWAD
SAUDI ARABIA

ABSTRACT

This contribution investigates the q-analogues of fractional operators concerning another function in the power-law within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Invited and plenary lectures

ON HERMITE-HADAMARD INEQUALITIES: BRIDGING CLASSICAL AND FRACTIONAL INTEGRALS

HÜSEYIN BUDAK
TURKEY

ABSTRACT

This contribution investigates on hermite-hadamard inequalities: bridging classical and fractional integrals within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Invited and plenary lectures

ANALYTICAL STUDY OF KIRCHHOFF (P,Q)-LAPLACIAN SYSTEMS ON POSTCRITICALLY FINITE FRACTALS

CHOUHAÏD SOUISSI
TUNISIA

ABSTRACT

This contribution studies analytical study of kirchhoff (p,q)-laplacian systems on postcritically finite fractals using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Invited and plenary lectures

THEORETICAL ANALYSIS FOR SOME FRACTIONAL INVERSE AND ILL-POSED PROBLEMS

NADJIB BOUSSETILA
ALGERIA

ABSTRACT

This contribution investigates theoretical analysis for some fractional inverse and ill-posed problems within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Invited and plenary lectures

ASYMPTOTIC BEHAVIOR OF PANTOGRAPH DELAY DIFFERENTIAL EQUATIONS

TOMÁS CARABALLO
SPAIN

ABSTRACT

This contribution investigates asymptotic behavior of pantograph delay differential equations within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Time-Delay Systems, Fractional Calculus, Differential Equations

Invited and plenary lectures

FRACTIONAL CALCULUS AND TIME-FRACTIONAL DIFFERENTIAL EQUATIONS: OLD AND NEW RESULTS

HAMID BOULARES
ALGERIA

ABSTRACT

This contribution investigates fractional calculus and time-fractional differential equations: old and new results within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Chapter 2

Oral presentations

Oral presentations

Simulation and optimization of output characteristics related to P3HT/PCBM based solar cells

Rebiha Labbani
Algeria

ABSTRACT

This contribution develops a mathematical and computational analysis of simulation and optimization of output characteristics related to p3ht/pcbm based solar cells. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Optimization, Energy, Thermal Systems

Oral presentations

Enhanced Operational Matrix Method for Solving Nonlinear Fractional and Ordinary Systems

SONDOS SYAM
Malaysia

ABSTRACT

This contribution investigates enhanced operational matrix method for solving nonlinear fractional and ordinary systems within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

The maximum number of limit cycles in generalized Riccati systems

Yassine Bouattia
Algeria

ABSTRACT

This contribution investigates the maximum number of limit cycles in generalized riccati systems within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Analytical and Numerical Treatment of a Fractional Model for the PANTOGRAPH

Sami Segni
Algeria

ABSTRACT

This contribution investigates analytical and numerical treatment of a fractional model for the pantograph within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Numerical Methods for approximating line integrals

Muhammed Syam
United Arab Emirates

ABSTRACT

This contribution investigates numerical methods for approximating line integrals within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

A Nyström Method for Fractional Delay Differential Equations with Mixed Caputo and Riemann-Liouville Derivatives

Ridha Dida
Algeria

ABSTRACT

This contribution investigates a nyström method for fractional delay differential equations with mixed caputo and riemann-liouville derivatives within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Time-Delay Systems, Fractional Calculus, Differential Equations

Oral presentations

Trapezoidal type inequalities via (s,m)-preinvex functions for Caputo fractional derivatives

Ali Berkane
Algeria

ABSTRACT

This contribution investigates trapezoidal type inequalities via (s,m)-preinvex functions for caputo fractional derivatives within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Improving Breast Cancer Diagnosis: Comparison of four CNN Models with Data Augmentation, Gamma Correction, and CLAHE

Oumayma Jarray
Tunisia

ABSTRACT

This study presents a data-driven methodology for improving breast cancer diagnosis: comparison of four cnn models with data augmentation, gamma correction, and clahe. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

AI-Powered Tumor Detection in MRI Scans: A Data-Driven Approach for Medical Imaging Automation

Ahmed Tedjani
Algeria

ABSTRACT

This study presents a data-driven methodology for ai-powered tumor detection in mri scans: a data-driven approach for medical imaging automation. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Medical Imaging, Artificial Intelligence, Data-Driven Modelling

Oral presentations

Hybrid GenAI-driven Tool for Automatic Image Annotation: AutoNota

SAMEH NAILI BOUALIA
France

ABSTRACT

This study presents a data-driven methodology for hybrid genai-driven tool for automatic image annotation: autonota. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

A New GenAI-Based Strategy for Label Enrichment in Medical Named Entity Recognition on the DEFT 2020 Dataset

Mouna Sabrine MAYOUF
France

ABSTRACT

This study presents a data-driven methodology for a new genai-based strategy for label enrichment in medical named entity recognition on the deft 2020 dataset. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Medical Imaging, Artificial Intelligence, Data-Driven Modelling

Oral presentations

BP-FSFNet: Boundary-Prior Frequency-Spatial Fusion Network

Emira Kechiche
Tunisia

ABSTRACT

This contribution investigates bp-fsfnet: boundary-prior frequency-spatial fusion network within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Neural Network model for predicting effectiveness of air -to- air rotary heat exchanger

Fatih Bouzeffour
Algeria

ABSTRACT

This study presents a data-driven methodology for neural network model for predicting effectiveness of air -to- air rotary heat exchanger. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Neural Networks, Heat Transfer, Artificial Intelligence, Data-Driven Modelling

Oral presentations

Mathematical and Computational Challenges in the Dynamic Analysis of Contact Problems: Eigenfrequency Determination of a Plate Resting on an Elastic Half-Space in Cartesian Coordinates

Salah Guenfoud
Algeria

ABSTRACT

This contribution examines mathematical and computational challenges in the dynamic analysis of contact problems: eigenfrequency determination of a plate resting on an elastic half-space in cartesian coordinates through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Oral presentations

Preliminary Validation of the Thermal-Hydraulics Module of MOOSE for Research Reactor Applications

Ulisses Alves Maciel Neto
Brazil

ABSTRACT

This contribution develops a mathematical and computational analysis of preliminary validation of the thermal-hydraulics module of moose for research reactor applications. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Energy, Thermal Systems

Oral presentations

The Role of Stochastic Particle Approximation in Modern Data Science

Ibrahim Sadok
Algeria

ABSTRACT

This study develops a statistical methodology for the role of stochastic particle approximation in modern data science. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Stochastic Modelling, Statistics, Stochastic Modelling

Oral presentations

A Matrix-Free Krylov Framework for Parallel-in-Time Integration

Mohamed Kamel Riahi
United Arab Emirates

ABSTRACT

This contribution investigates a matrix-free krylov framework for parallel-in-time integration within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

A global method for integer linear multiplicative programming problems based on efficient cuts

SALIMA AMROUCHE
Algeria

ABSTRACT

This work considers a global method for integer linear multiplicative programming problems based on efficient cuts as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Oral presentations

MULTIPLE CRITERA WATERSHED PRIORITIZATION FOR FLOOD RISK MANAGEMENT

Anissa Frini
Canada

ABSTRACT

This work considers multiple critera watershed prioritization for flood risk management as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Oral presentations

Chaotic Dynamics of Discrete-Time Integer- and Fractional-Order Computer Virus Memristor System

Imane ZOUAK
Algeria

ABSTRACT

This contribution investigates chaotic dynamics of discrete-time integer- and fractional-order computer virus memristor system within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Mathematical Bridge on Fractional Sturm-Liouville Operators

Merve Usen Dogdu
Turkey

ABSTRACT

This contribution investigates mathematical bridge on fractional sturm-liouville operators within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

On 1 l-norm and 0 l-norm regularization algorithms for computed tomography image reconstruction

Jiehua Zhu
United States

ABSTRACT

This work considers on 1 l-norm and 0 l-norm regularization algorithms for computed tomography image reconstruction as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Oral presentations

A Mathematical Model and Simulation Framework for Dynamic Sub-band Allocation in IoT Networks

Abdelhak Goutal
Algeria

ABSTRACT

This contribution investigates a mathematical model and simulation framework for dynamic sub-band allocation in iot networks within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Chaos control in incommensurate fractional discrete neural networks

Louiza Diabi
Algeria

ABSTRACT

This contribution investigates chaos control in incommensurate fractional discrete neural networks within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Control Systems, Neural Networks, Fractional Calculus, Differential Equations

Oral presentations

Asymmetric kernel estimation of the regression function

Siham BEY
Algeria

ABSTRACT

This study develops a statistical methodology for asymmetric kernel estimation of the regression function. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Regression, Statistics, Stochastic Modelling

Oral presentations

Optimizing the Ratio of Linear Functions in Multi-Objective Integer Linear Programs: An Exact Algorithm

YOUNSI née ABBACI Leila
Algeria

ABSTRACT

This work considers optimizing the ratio of linear functions in multi-objective integer linear programs: an exact algorithm as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Oral presentations

Newton Direction vs. Conjugacy Condition Hybridization: A Comparative Study of Conjugate Gradient Methods

Romaissa Mellal
Algeria

ABSTRACT

This work considers newton direction vs. conjugacy condition hybridization: a comparative study of conjugate gradient methods as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Oral presentations

Adjoint Equation and Sufficent Optimality Conditions for Stochastic Control of Jump Diffusion Processes

Dahbia Hafayed
Algeria

ABSTRACT

This work addresses adjoint equation and sufficent optimality conditions for stochastic control of jump diffusion processes from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Stochastic Modelling, Dynamical Systems, Control

Oral presentations

Computational Modeling of the Elictrical Properties of Eu-Doped GaN via Density Functional Theory

Abdelkader NOURI
Algeria

ABSTRACT

This contribution investigates computational modeling of the elictrical properties of eu-doped gan via density functional theory within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Smart Beehive Monitoring Using AIoT

KHELIFA BENAHMED
Algeria

ABSTRACT

This study presents a data-driven methodology for smart beehive monitoring using aiot. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

Electronic structure and elastic response of Mg2X (X = C, Si, Ge, Sn) binary compounds: A DFT-Based Study

DJELLAB SIHEM
Algeria

ABSTRACT

This contribution examines electronic structure and elastic response of mg2x (x = c, si, ge, sn) binary compounds: a dft-based study through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Oral presentations

Magnetic, structural properties and morphological evolution of FeTiO2, FeTiO3 nanocomposites synthetized by powder metallurgy process

Rachid AMRAOUI
Algeria

ABSTRACT

This contribution examines magnetic, structural properties and morphological evolution of fetio2, fetio3 nanocomposites synthetized by powder metallurgy process through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Oral presentations

Mathematical Modeling of Nonlinear Current Voltage Characteristics of Photovoltaic Models

SOUAIDI FATIMA EZZAHRAE
Morocco

ABSTRACT

This study presents a data-driven methodology for mathematical modeling of nonlinear current voltage characteristics of photovoltaic models. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Photovoltaic Systems, Artificial Intelligence, Data-Driven Modelling

Oral presentations

The M-inverse nodal problem for sturm-liouville operators with framework visual shapes

Merve Karaoglan
Turkey

ABSTRACT

This contribution studies the m-inverse nodal problem for sturm-liouville operators with framework visual shapes using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Control of Incommensurate Fractional-Order Discrete-Time SI Model for Computer Viruses

Imane Zouak
Algeria

ABSTRACT

This contribution investigates control of incommensurate fractional-order discrete-time si model for computer viruses within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Control Systems, Fractional Calculus, Differential Equations

Oral presentations

On Synchronization of Incommensurate Chaotic Fractional Discrete Model of Computer Virus

Imane Zouak
Algeria

ABSTRACT

This contribution investigates on synchronization of incommensurate chaotic fractional discrete model of computer virus within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Memristor-based Chialvo Neurons Map with Variable Fractional Order: Chaos and Stabilization

Louiza Diabi
Algeria

ABSTRACT

This contribution investigates memristor-based chialvo neurons map with variable fractional order: chaos and stabilization within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Lyapunov Criteria for Input-to-State Practical Stability of Nonautonomous Infinite-Dimensional Systems

Rahma Heni
Tunisia

ABSTRACT

This work addresses lyapunov criteria for input-to-state practical stability of nonautonomous infinite-dimensional systems from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Dynamical Systems, Control

Oral presentations

Strategic Operations Management: A Mathematical Framework for Balancing Cost Efficiency and Agility

Nadjla Boutelhig
Algeria

ABSTRACT

This contribution investigates strategic operations management: a mathematical framework for balancing cost efficiency and agility within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

On the periodic orbits in certain class of fourth-order autonomous differential equations via averaging theory

Nabil Sellami
Algeria

ABSTRACT

This study presents a data-driven methodology for on the periodic orbits in certain class of fourth-order autonomous differential equations via averaging theory. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

Semiclosed Linear Relations Induced by Quotients of Bounded Operators

Gherbi Abdellah
Algeria

ABSTRACT

This contribution studies semiclosed linear relations induced by quotients of bounded operators using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

FIBONACCI-MANN PROCESS FOR MONOTONE TOTAL ASYMPTOTICALLY NONEXPANSIVE MAPPINGS

KAWTHER MAMMERI
Algeria

ABSTRACT

This contribution investigates fibonacci-mann process for monotone total asymptotically nonexpansive mappings within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Analysis of Weighted Edge Mostar Indices for Specific Graph Products

Zahid Raza
United Arab Emirates

ABSTRACT

This contribution studies analysis of weighted edge mostar indices for specific graph products using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Data-Driven Prediction of Swift Hardening Model Parameters from Tensile Curve Shape Indices

Tasnime Hamdeni
Tunisia

ABSTRACT

This study presents a data-driven methodology for data-driven prediction of swift hardening model parameters from tensile curve shape indices. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

Copula-Based Preprocessing technique for Multi-Label AI Models

Loubna Karbil
Morocco

ABSTRACT

This study presents a data-driven methodology for copula-based preprocessing technique for multi-label ai models. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

New stability results for Caputo conformable fractional-order systems - application for a non- fragile H observer

Hassen Ahmed
Tunisia

ABSTRACT

This contribution investigates new stability results for caputo conformable fractional-order systems - application for a non- fragile h observer within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Stability Analysis, Fractional Calculus, Differential Equations

Oral presentations

A New Weakly Singular Gronwall Inequality and Its Applications to Fractional Differential Equations

Amine Ghoudi
Tunisia

ABSTRACT

This contribution investigates a new weakly singular gronwall inequality and its applications to fractional differential equations within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

FRACTIONAL 3=8-SIMPSON TYPE INEQUALITIES FOR DIFFERENTIABLE s-CONVEX FUNCTIONS

Naima Larribi
Algeria

ABSTRACT

This contribution investigates fractional 3=8-simpson type inequalities for differentiable s-convex functions within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Uniqueness and Ulam Stability Results for a Coupled System of Fuzzy Fractional Differential Equations via the chi-Fuzzy Fractional Derivative

Assia Boudjerida
Algeria

ABSTRACT

This contribution investigates uniqueness and ulam stability results for a coupled system of fuzzy fractional differential equations via the chi-fuzzy fractional derivative within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Stability Analysis, Fractional Calculus, Differential Equations

Oral presentations

Generalized Fractional Thermoelasticity with a Time-Transform Function psi(t): Modeling and Physical Interpretation

Benia Kheireddine
Algeria

ABSTRACT

This contribution investigates generalized fractional thermoelasticity with a time-transform function psi(t): modeling and physical interpretation within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Existence and optimal control of an age-structured population dynamics model with time fractional

Djihad AIMENE
Algeria

ABSTRACT

This contribution investigates existence and optimal control of an age-structured population dynamics model with time fractional within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Control Systems, Fractional Calculus, Differential Equations

Oral presentations

Nonparametric Estimation of a Censored Regression Function under Widely Orthant Dependence

Bessa Houria
Algeria

ABSTRACT

This study develops a statistical methodology for nonparametric estimation of a censored regression function under widely orthant dependence. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Regression, Statistics, Stochastic Modelling

Oral presentations

Practical exponentially output feedback stabilisation for perturbed time varying systems with multiple delays

khelifa hizia
Algeria

ABSTRACT

This contribution investigates practical exponentially output feedback stabilisation for perturbed time varying systems with multiple delays within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Time-Delay Systems, Industrial, Applied Mathematics

Oral presentations

A New tempered Weakly Singular Gronwall Inequality and Its Applications to tempered Fractional Differential Equations

Ahmed Taktak
Tunisia

ABSTRACT

This contribution investigates a new tempered weakly singular gronwall inequality and its applications to tempered fractional differential equations within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

On the study of Solutions for a boundary value problem with fractional derivative of Hadamard

Amina Boucenna
Algeria

ABSTRACT

This contribution investigates on the study of solutions for a boundary value problem with fractional derivative of hadamard within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

BIFURCATION OF LIMIT CYCLES IN GENERALIZED WHITTAKER-INCE EQUATIONS VIA AVERAGING THEORY

KINA Abdelkrim
Algeria

ABSTRACT

This work addresses bifurcation of limit cycles in generalized whittaker-ince equations via averaging theory from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Dynamical Systems, Control

Oral presentations

Finite-Time Stability of psi-Caputo Fractional Stochastic Differential Equations

Kamila Grara
Algeria

ABSTRACT

This contribution investigates finite-time stability of psi-caputo fractional stochastic differential equations within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Stability Analysis, Stochastic Modelling, Fractional Calculus, Differential Equations

Oral presentations

New Formula for Divisibility by some prime numbers

Alfaisal Hasan
Egypt

ABSTRACT

This contribution investigates new formula for divisibility by some prime numbers within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

An Enhanced Parametric Kernel Function for Interior-Point Methods in Linear Programming

Amrane Houas
Algeria

ABSTRACT

This work considers an enhanced parametric kernel function for interior-point methods in linear programming as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Oral presentations

Chaos Generation and Bifurcation Patterns in a Discrete Conformable HIV-Cancer-Immune Model

Asmaa Rayhana Dja Daouadji
Algeria

ABSTRACT

This work addresses chaos generation and bifurcation patterns in a discrete conformable hiv-cancer-immune model from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Dynamical Systems, Control

Oral presentations

Impact of replacing cement with limestone fillers on the physicochemical and mechanical characteristics of self-compacting mortar

Brahim Hami
Algeria

ABSTRACT

This contribution investigates impact of replacing cement with limestone fillers on the physicochemical and mechanical characteristics of self-compacting mortar within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Valorization of Plant Fiber Use in Concrete

GHERDAOUI CHERIFA
Algeria

ABSTRACT

This contribution examines valorization of plant fiber use in concrete through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Oral presentations

A Study of Spectral Features of Linear Operators Acting on Exotic Banach Spaces

Rabah DEBBAR
Algeria

ABSTRACT

This contribution studies a study of spectral features of linear operators acting on exotic banach spaces using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Spectral Analysis, Pure, Applied Analysis

Oral presentations

On nonlinear coupled systems of impulsive differential equations with sequential fractional derivatives

Said Baghdad
Algeria

ABSTRACT

This contribution investigates on nonlinear coupled systems of impulsive differential equations with sequential fractional derivatives within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Mathematical Modelling of Population Usage of Renewable and Non-Renewable Resources within a Context of Climate Change and Urban Expansion in Kombissiri, Burkina Faso

Malicki ZOROM
Burkina Faso

ABSTRACT

This contribution investigates mathematical modelling of population usage of renewable and non-renewable resources within a context of climate change and urban expansion in kombissiri, burkina faso within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Modeling and control of two energy production sources

BELKACEM BELKACEM
Algeria

ABSTRACT

This work addresses modeling and control of two energy production sources from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Dynamical Systems, Control

Oral presentations

Generalized Least Square Estimation of the Exponential Frechet Distribution: Monte Carlo Simulation and Application

KHEMISSI Zahia
Algeria

ABSTRACT

This study develops a statistical methodology for generalized least square estimation of the exponential frechet distribution: monte carlo simulation and application. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Statistics, Stochastic Modelling

Oral presentations

Q-fractional multiple trapping model of time of flight transient photocurrents in amorphous semiconductors

Abdelmalek Boumali
Algeria

ABSTRACT

This contribution investigates q-fractional multiple trapping model of time of flight transient photocurrents in amorphous semiconductors within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Well-posedness and stability of fractional thermistor models with multi-order caputo derivatives and nonlocal joule heating

Yahia Awad
Lebanon

ABSTRACT

This contribution investigates well-posedness and stability of fractional thermistor models with multi-order caputo derivatives and nonlocal joule heating within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Stability Analysis, Heat Transfer, Fractional Calculus, Differential Equations

Oral presentations

Global attractors for the complex Cahn-Hilliard-Oono type equation

Sami Hammoud
Lebanon

ABSTRACT

This contribution investigates global attractors for the complex cahn-hilliard-oono type equation within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Analysis of a Delay Differential Equation model with Biological application

Ragheb MGHAMES
Lebanon

ABSTRACT

This paper proposes a mathematical framework for analysis of a delay differential equation model with biological application. The relevant biological or clinical mechanisms are translated into interacting state variables, constitutive relations, or data-driven components. Model parameters are linked to observable quantities, and the analysis considers equilibrium behaviour, sensitivity, identifiability, and uncertainty where appropriate. A numerical strategy is used to explore clinically or biologically meaningful scenarios and to compare alternative interventions, operating assumptions, or diagnostic configurations. Validation is framed through consistency with representative observations and standard performance measures rather than through isolated simulations. The resulting approach is intended to improve mechanistic understanding, support hypothesis generation, and provide a reproducible basis for future studies using larger datasets or prospective experiments. Limitations related to data quality and model simplification are explicitly recognized.

Keywords: Time-Delay Systems, Mathematical Biology, Biomedical Modelling

Oral presentations

Numerical analysis of 1D and 2D pressure-driven phase field models

Hussein Fakih
Lebanon

ABSTRACT

This contribution investigates numerical analysis of 1d and 2d pressure-driven phase field models within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

L'espace tangante et affine d'une sous variété définie par des fonctions difféomorphisme paramétrisées

Messaadia Hamouda
Algeria

ABSTRACT

This contribution investigates l'espace tangante et affine d'une sous variété définie par des fonctions difféomorphisme paramétrisées within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Mathematical modeling of wind energy potential using the Weibull distribution

EL YAQOUTI Mustapha
Morocco

ABSTRACT

This contribution develops a mathematical and computational analysis of mathematical modeling of wind energy potential using the weibull distribution. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Energy, Thermal Systems

Oral presentations

Stability of Almost Periodic Solutions in PCA-Recurrent Neural Networks

Zehour Benbouziane-Nedjraoui
Algeria

ABSTRACT

This work addresses stability of almost periodic solutions in pca-recurrent neural networks from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Neural Networks, Dynamical Systems, Control

Oral presentations

A new family of hybrid conjugate gradient method for unconstrained optimization

Amira HAMDI
Algeria

ABSTRACT

This study presents a data-driven methodology for a new family of hybrid conjugate gradient method for unconstrained optimization. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Optimization, Artificial Intelligence, Data-Driven Modelling

Oral presentations

Bright, Dark, Periodic, and Singular Solutions of the Nonlinear Klein-Gordon Equation Using Symbolic and Algebraic Techniques

Abdulmalik Altwaty
Libya

ABSTRACT

This study presents a data-driven methodology for bright, dark, periodic, and singular solutions of the nonlinear klein-gordon equation using symbolic and algebraic techniques. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

Asymptotic properties of regression operator in local linear estimation with missing at random data

Abbassia BENCHIHA
Algeria

ABSTRACT

This study develops a statistical methodology for asymptotic properties of regression operator in local linear estimation with missing at random data. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Regression, Statistics, Stochastic Modelling

Oral presentations

Numerical Simulation of Time-of-Flight Transient Photocurrents in Coplanar Electrode Configurations Using Inverse Laplace Transform Techniques

Fadila Serdouk
Algeria

ABSTRACT

This contribution investigates numerical simulation of time-of-flight transient photocurrents in coplanar electrode configurations using inverse laplace transform techniques within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

On distinguinshing coloring of some graphs

Hayat Issaadi
Algeria

ABSTRACT

This contribution studies on distinguinshing coloring of some graphs using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Adomian decomposition method applied to stochastic differential equations

Fateh Merahi
Algeria

ABSTRACT

This study develops a statistical methodology for adomian decomposition method applied to stochastic differential equations. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Stochastic Modelling, Statistics, Stochastic Modelling

Oral presentations

Novel One Parameter Family: Special Case, Bayesian Estimation, Simulation and Applications

Talhi Hamida
Algeria

ABSTRACT

This study develops a statistical methodology for novel one parameter family: special case, bayesian estimation, simulation and applications. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Statistics, Stochastic Modelling

Oral presentations

Management of DC bus voltage in hybrid system with PV-wind Turbine-battery connected to grid using Twisting sliding mode control

Merabet Hichem
Algeria

ABSTRACT

This work addresses management of dc bus voltage in hybrid system with pv-wind turbine-battery connected to grid using twisting sliding mode control from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Dynamical Systems, Control

Oral presentations

Existence of solutions to stationary MHD system with mixed boundary conditions involving the friction

Hanene Debbiche
Algeria

ABSTRACT

This contribution examines existence of solutions to stationary mhd system with mixed boundary conditions involving the friction through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Oral presentations

Generalized Contraction Maps and their Fixed points

Afrah Abdou
Saudi Arabia

ABSTRACT

This contribution studies generalized contraction maps and their fixed points using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Solvability of a Certain Fractional Pantograph Problem

Hamid BOULARES
Algeria

ABSTRACT

This contribution investigates solvability of a certain fractional pantograph problem within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Exact Controllability of Infinite-Dimensional Generalized Caputo Proportional Fractional Linear Systems.

Amel Merghad
Algeria

ABSTRACT

This contribution investigates exact controllability of infinite-dimensional generalized caputo proportional fractional linear systems. within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Control Systems, Fractional Calculus, Differential Equations

Oral presentations

Different values of order of Growth of solutions to certain class of fractional linear differential equations

Saada Hamouda
Algeria

ABSTRACT

This contribution investigates different values of order of growth of solutions to certain class of fractional linear differential equations within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Oral presentations

Bohr-Sommerfeld quantization conditions for Schrodinger operator: the Method of Microlocal Wronskian and Gram Matrix

Abdelwaheb Ifa
Tunisia

ABSTRACT

This contribution studies bohr-sommerfeld quantization conditions for schrodinger operator: the method of microlocal wronskian and gram matrix using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

On the Dynamics of Compressible Micropolar Fluids with Real Gas Laws: Existence Results and Qualitative Parameter Analysis

Angela Bašić-Šiško
Croatia

ABSTRACT

This contribution examines on the dynamics of compressible micropolar fluids with real gas laws: existence results and qualitative parameter analysis through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Oral presentations

Relatively Fredholm perturbation and stability of essential spectra of the sum of two operators matrices

Sana Bouzidi
Tunisia

ABSTRACT

This work addresses relatively fredholm perturbation and stability of essential spectra of the sum of two operators matrices from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Dynamical Systems, Control

Oral presentations

Some local spectral properties of right linear operator matrix in the quaternionic setting

Dorsaf Kouas
Tunisia

ABSTRACT

This contribution studies some local spectral properties of right linear operator matrix in the quaternionic setting using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Spectral Analysis, Pure, Applied Analysis

Oral presentations

Technology for Control in the Greenhouse Agriculture base IOT - Review

Seddiki Noureddine
Algeria

ABSTRACT

This work addresses technology for control in the greenhouse agriculture base iot - review from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Dynamical Systems, Control

Oral presentations

Biharmonic maps on epsilon-Kenmotsu Manifolds with a semi-symmetric metric connection

El Hendi Hichem
Algeria

ABSTRACT

This contribution studies biharmonic maps on epsilon-kenmotsu manifolds with a semi-symmetric metric connection using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Pseudo-Spectral Collocation Approach Using Vita-Lucas Polynomials for Stochastic Integral Equations

Rebiha Zeghdane
Algeria

ABSTRACT

This study develops a statistical methodology for pseudo-spectral collocation approach using vita-lucas polynomials for stochastic integral equations. The underlying probabilistic structure is specified and the estimator or computational procedure is derived under clearly stated regularity assumptions. Finite-sample behaviour is investigated through Monte Carlo experiments covering different sample sizes, dependence levels, censoring patterns, or noise conditions. Bias, variance, mean squared error, coverage, and computational effort are used as principal assessment criteria. When an application is relevant, the method is illustrated on a representative dataset and compared with established alternatives. The analysis highlights the circumstances in which the proposed formulation provides improved flexibility or robustness. The resulting framework offers a reproducible basis for inference and prediction in complex stochastic and data-limited environments.

Keywords: Stochastic Modelling, Spectral Analysis, Statistics, Stochastic Modelling

Oral presentations

Mathematical Analysis of Total Absorption Coefficient and Refractive Index Variations for Quantum Dots in Oxidative Medium under Electrostatic Flux

Amin Naifar
Tunisia

ABSTRACT

This contribution investigates mathematical analysis of total absorption coefficient and refractive index variations for quantum dots in oxidative medium under electrostatic flux within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Mathematical Analysis of Total Absorption Coefficient and Refractive Index Variations for Quantum Dots in Oxidative Medium under Electrostatic Flux

Imed Bouzida
Tunisia

ABSTRACT

This contribution investigates mathematical analysis of total absorption coefficient and refractive index variations for quantum dots in oxidative medium under electrostatic flux within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Existence of Positive Radial Solutions to a p-Laplacian Kirchhoff Type Problem on the Exterior of a Ball

Doudja Hebboul
Algeria

ABSTRACT

This contribution studies existence of positive radial solutions to a p-laplacian kirchhoff type problem on the exterior of a ball using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Palm Print Biometric Recognition Using AlexNet and 2D-DWT-Based Image Fusion.

Rachid CHELAOUA
Algeria

ABSTRACT

This study presents a data-driven methodology for palm print biometric recognition using alexnet and 2d-dwt-based image fusion.. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

Decay Behavior of Nonautonomous Semilinear Evolution Problems Under Variable Delay Feedback

Houria Chellaoua
Algeria

ABSTRACT

This work addresses decay behavior of nonautonomous semilinear evolution problems under variable delay feedback from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Time-Delay Systems, Dynamical Systems, Control

Oral presentations

Existence of infinitely many solutions for p(x)-Laplacian-like operators with effect of nonlocal terms

Said Ait Temghart
Morocco

ABSTRACT

This contribution studies existence of infinitely many solutions for p(x)-laplacian-like operators with effect of nonlocal terms using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

The class of p demicompact operators

Imen Ferjani
Tunisia

ABSTRACT

This contribution studies the class of p demicompact operators using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Prévision par la méthode des sieves d'un processus autorégressif Hilbertien

Kamila Berhoune
Algeria

ABSTRACT

This contribution investigates prévision par la méthode des sieves d'un processus autorégressif hilbertien within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Liouville type theorems for stable solutions of the weighted system involving the Grushin operator with negative exponents

Foued Mtiri
Saudi Arabia

ABSTRACT

This contribution studies liouville type theorems for stable solutions of the weighted system involving the grushin operator with negative exponents using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Convergence of Adaptive Preorder-Constrained Saddle-Point Dynamics: Theory and Applications

Wissam LATRECHE
Algeria

ABSTRACT

This study presents a data-driven methodology for convergence of adaptive preorder-constrained saddle-point dynamics: theory and applications. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Oral presentations

On the Iterative Learning Control

Ghania REBIAI
Algeria

ABSTRACT

This work addresses on the iterative learning control from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Dynamical Systems, Control

Oral presentations

Stability in inverse scattering problem with non-radially symmetric potential in 2D

Lahcène Chorfi
Algeria

ABSTRACT

This work addresses stability in inverse scattering problem with non-radially symmetric potential in 2d from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Dynamical Systems, Control

Oral presentations

Existence of weak solutions for a nonlinear PDE system modeling flow in nanoporous media

Imane MELZI
Algeria

ABSTRACT

This contribution investigates existence of weak solutions for a nonlinear pde system modeling flow in nanoporous media within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Existence And Uniqueness Of a Weak Solution For p-Laplacian Problem

Bounouala Amina
Algeria

ABSTRACT

This contribution studies existence and uniqueness of a weak solution for p-laplacian problem using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Oral presentations

Stabilization of nonlinear systems

Yahya Siwar
Tunisia

ABSTRACT

This contribution investigates stabilization of nonlinear systems within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Oral presentations

Relative Cohomology spaces for some osp (n/2)-modules

Wafa Mtaouaa
Saudi Arabia

ABSTRACT

This contribution studies relative cohomology spaces for some osp (n/2)-modules using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Chapter 3

Poster presentations

Poster presentations

Mathematical Modeling of non-small-cell Lung Cancer (NSCLC) By Adding Surgery and Chemotherapy and steady state

Fatima Sadaga
Libya

ABSTRACT

This paper proposes a mathematical framework for mathematical modeling of non-small-cell lung cancer (nsclc) by adding surgery and chemotherapy and steady state. The relevant biological or clinical mechanisms are translated into interacting state variables, constitutive relations, or data-driven components. Model parameters are linked to observable quantities, and the analysis considers equilibrium behaviour, sensitivity, identifiability, and uncertainty where appropriate. A numerical strategy is used to explore clinically or biologically meaningful scenarios and to compare alternative interventions, operating assumptions, or diagnostic configurations. Validation is framed through consistency with representative observations and standard performance measures rather than through isolated simulations. The resulting approach is intended to improve mechanistic understanding, support hypothesis generation, and provide a reproducible basis for future studies using larger datasets or prospective experiments. Limitations related to data quality and model simplification are explicitly recognized.

Keywords: Mathematical Biology, Biomedical Modelling

Poster presentations

Locally phi-symmetric Legendre curves on Lorentzian Heisenberg group

Mansour Belarbi
Algeria

ABSTRACT

This contribution investigates locally phi-symmetric legendre curves on lorentzian heisenberg group within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Characterization and Fuel Properties of Bioethanol Derived from Low-Value Hmira Dates (Phoenix dactylifera L.) in Adrar, Algeria

Bakache Younes
Algeria

ABSTRACT

This contribution investigates characterization and fuel properties of bioethanol derived from low-value hmira dates (phoenix dactylifera l.) in adrar, algeria within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Mathematical Modeling and Energy Flow Analysis of a Rooftop Photovoltaic System for Educational Infrastructure.

Saida Madi
Algeria

ABSTRACT

This study presents a data-driven methodology for mathematical modeling and energy flow analysis of a rooftop photovoltaic system for educational infrastructure.. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Photovoltaic Systems, Artificial Intelligence, Data-Driven Modelling

Poster presentations

Artificial Intelligence and Mathematical Modeling for Accurate Parameter Identification in Photovoltaic Panels

Zahira Chouiref
Algeria

ABSTRACT

This study presents a data-driven methodology for artificial intelligence and mathematical modeling for accurate parameter identification in photovoltaic panels. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Photovoltaic Systems, Artificial Intelligence, Data-Driven Modelling

Poster presentations

Mathematical analysis of photovoltaic array's energy: A studied case installed to supply a primary school

Saida Madi
Algeria

ABSTRACT

This study presents a data-driven methodology for mathematical analysis of photovoltaic array's energy: a studied case installed to supply a primary school. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Photovoltaic Systems, Artificial Intelligence, Data-Driven Modelling

Poster presentations

Simulation and Performance Study of InGaN/GaN p-i-n Photodiodes for UV Detection Using Silvaco Atlas

Hafi Nabil
Algeria

ABSTRACT

This contribution investigates simulation and performance study of ingan/gan p-i-n photodiodes for uv detection using silvaco atlas within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

An Enhanced Branch and Bound Method for Minimizing a Nonconvex Function

Djamel Aaid
Algeria

ABSTRACT

This work considers an enhanced branch and bound method for minimizing a nonconvex function as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Poster presentations

A Novel GenAI-Based Framework for Automatic Radiology Report Generation: Integrating State-of-the-Art Insights with a Curriculum Learning Strategy

Mouna Mayouf
France

ABSTRACT

This study presents a data-driven methodology for a novel genai-based framework for automatic radiology report generation: integrating state-of-the-art insights with a curriculum learning strategy. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Ultrasonic Spray Pyrolysis Synthesis and Characterization of Co-Doped ZnO Thin Films

Sammar Souria
Algeria

ABSTRACT

This contribution investigates ultrasonic spray pyrolysis synthesis and characterization of co-doped zno thin films within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Surface Hole Defect Detection Based on Pixel Classification Approach

Samira Taleb
Algeria

ABSTRACT

This study presents a data-driven methodology for surface hole defect detection based on pixel classification approach. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Monitoring and fault detection in a pharmaceutical production line.

Nedjma Salhi
Algeria

ABSTRACT

This contribution investigates monitoring and fault detection in a pharmaceutical production line. within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Hybrid-Functional Calculations of the Sn-doped ZnO's Opto-electronic Properties

Gherib Mebarka
Algeria

ABSTRACT

This contribution investigates hybrid-functional calculations of the sn-doped zno's opto-electronic properties within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Valorization of Chestnut Bark as a Natural Biosorbent for Cationic Dye Removal from Wastewater

Bensid Nadia
Algeria

ABSTRACT

This contribution investigates valorization of chestnut bark as a natural biosorbent for cationic dye removal from wastewater within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Valorization of biomaterial waste and its application in wastewater treatment

Bensid Nadia
Algeria

ABSTRACT

This contribution examines valorization of biomaterial waste and its application in wastewater treatment through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

ML-Based Prediction of Missing Well Log Parameters in the Hassi Terfa Field, Southeastern Algeria

Merabti Hocine
Algeria

ABSTRACT

This study presents a data-driven methodology for ml-based prediction of missing well log parameters in the hassi terfa field, southeastern algeria. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Rolling bearing faults detection in variable regime using CEEMDAN and order tracking analysis: Application to a wind turbine diagnosis

Abderrazek Djebala
Algeria

ABSTRACT

This contribution develops a mathematical and computational analysis of rolling bearing faults detection in variable regime using ceemdan and order tracking analysis: application to a wind turbine diagnosis. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Energy, Thermal Systems

Poster presentations

Theoretical and Numerical Study of Combined Effects of the Lubricant Fluid Rheology and Surface Condition on the Static Performances of the Compliant Journal Bearing

Boucherit Hamid
Algeria

ABSTRACT

This contribution examines theoretical and numerical study of combined effects of the lubricant fluid rheology and surface condition on the static performances of the compliant journal bearing through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Refined descriptive sampling with dependent variables

Siham Kebaili
Algeria

ABSTRACT

This contribution investigates refined descriptive sampling with dependent variables within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Deterministic and Stochastic Approaches to Modeling Cancer Responses to Immunotherapy and Virotherapy

Mariem Elkaf
Morocco

ABSTRACT

This paper proposes a mathematical framework for deterministic and stochastic approaches to modeling cancer responses to immunotherapy and virotherapy. The relevant biological or clinical mechanisms are translated into interacting state variables, constitutive relations, or data-driven components. Model parameters are linked to observable quantities, and the analysis considers equilibrium behaviour, sensitivity, identifiability, and uncertainty where appropriate. A numerical strategy is used to explore clinically or biologically meaningful scenarios and to compare alternative interventions, operating assumptions, or diagnostic configurations. Validation is framed through consistency with representative observations and standard performance measures rather than through isolated simulations. The resulting approach is intended to improve mechanistic understanding, support hypothesis generation, and provide a reproducible basis for future studies using larger datasets or prospective experiments. Limitations related to data quality and model simplification are explicitly recognized.

Keywords: Stochastic Modelling, Mathematical Biology, Biomedical Modelling

Poster presentations

Determining a scattering potential from far-field data

Imene Khélifa
Algeria

ABSTRACT

This contribution investigates determining a scattering potential from far-field data within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

The Boundary Integral Method for the Laplace equation with oblique conditions

Hamza Bouguerne
Algeria

ABSTRACT

This contribution investigates the boundary integral method for the laplace equation with oblique conditions within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Periodic Orbit for a class of Eighth-Order Non-Autonomous Differential Equations via Averaging Theory

Chems Eddine Berrehail
Algeria

ABSTRACT

This contribution investigates periodic orbit for a class of eighth-order non-autonomous differential equations via averaging theory within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

A Novel q-Extension of the Fréchet Distribution: Theory, Simulation, and Real-World Data Modelling

Hennia Douini
Algeria

ABSTRACT

This contribution investigates a novel q-extension of the fréchet distribution: theory, simulation, and real-world data modelling within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Differential Equations

Poster presentations

Non-Instantaneous Impulsive Fractional Integro-Differential Equations with StateDependent Delay

Aissani Khalida
Algeria

ABSTRACT

This contribution investigates non-instantaneous impulsive fractional integro-differential equations with statedependent delay within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Time-Delay Systems, Fractional Calculus, Differential Equations

Poster presentations

Neutral Functional Sequential Differential Equations with Caputo Fractional Derivative on Time Scales

Benkhettou Nadia
Algeria

ABSTRACT

This contribution investigates neutral functional sequential differential equations with caputo fractional derivative on time scales within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Poster presentations

Fractional Memory Effects in Generalized Thermo-Viscoelastic Contact

Roufaida Ketfi
Algeria

ABSTRACT

This contribution investigates fractional memory effects in generalized thermo-viscoelastic contact within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Fractional Calculus, Differential Equations

Poster presentations

Advancing Photovoltaic Modeling: Dholes-Inspired Optimization for Single-Diode Parameter Identification

El Hanafi Arjdal
Morocco

ABSTRACT

This study presents a data-driven methodology for advancing photovoltaic modeling: dholes-inspired optimization for single-diode parameter identification. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Optimization, Photovoltaic Systems, Artificial Intelligence, Data-Driven Modelling

Poster presentations

Asymptotically Almost Automorphic Mild Solutions for Semilinear Integro-differential Evolution Equations

Sara Litimein
Algeria

ABSTRACT

This contribution investigates asymptotically almost automorphic mild solutions for semilinear integro-differential evolution equations within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Differential Equations

Poster presentations

Thermo-hydrodynamic modeling of a finite length journal bearing operating under lubricants containing CuO and Al2O3 nanoparticles.

Ahcene Mouassa
Algeria

ABSTRACT

This study presents a data-driven methodology for thermo-hydrodynamic modeling of a finite length journal bearing operating under lubricants containing cuo and al2o3 nanoparticles.. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Modeling and Optimization of the Parameters Influencing the Stability of Back to Back Reinforced Earth Walls using Response Surface Methodology

Brahim Lafifi
Algeria

ABSTRACT

This work addresses modeling and optimization of the parameters influencing the stability of back to back reinforced earth walls using response surface methodology from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Optimization, Dynamical Systems, Control

Poster presentations

Title: Systems of Linear Equations in Generalized b-Metric Spaces

Ahmad Aloqaily
Saudi Arabia

ABSTRACT

This contribution investigates title: systems of linear equations in generalized b-metric spaces within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

PHENOMENA OF TRANSPORT AND ELECTROKINETIC DECONTAMINATION OF THE ALUMINIUM AND SULPHATES OF A DAIRY SLUDG

Belgacem Mansouri
Algeria

ABSTRACT

This study presents a data-driven methodology for phenomena of transport and electrokinetic decontamination of the aluminium and sulphates of a dairy sludg. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Processing Routes for Medium-Manganese Steel to Enhance the Strength-Ductility Synergy

Alimi Latifa
Algeria

ABSTRACT

This contribution examines processing routes for medium-manganese steel to enhance the strength-ductility synergy through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Statistical Modeling and Optimization of Electrodeposition Parameters to Enhance the Surface Quality of Co-Ag Coatings

Ouarda Kirati
Algeria

ABSTRACT

This work considers statistical modeling and optimization of electrodeposition parameters to enhance the surface quality of co-ag coatings as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Optimization, Operations Research

Poster presentations

Modeling Global Horizontal Solar Radiation in Arid Desert Regions: The Case of Adrar, Algeria

Babahadj Abdeldjbbar
Algeria

ABSTRACT

This contribution develops a mathematical and computational analysis of modeling global horizontal solar radiation in arid desert regions: the case of adrar, algeria. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Energy, Thermal Systems

Poster presentations

A Novel Class of Discriminants for Multiplicity of Complex Roots Characteristics in Real Quintic Polynomials: An introduction to a new root complex analysis approach of real quintic polynomials and above

Amor Boulouma
Algeria

ABSTRACT

This contribution studies a novel class of discriminants for multiplicity of complex roots characteristics in real quintic polynomials: an introduction to a new root complex analysis approach of real quintic polynomials and above using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Poster presentations

Rep PCR identification and Functional properties of LAB Using Bioinformatics Techniques

Akil Loumani
Algeria

ABSTRACT

This contribution investigates rep pcr identification and functional properties of lab using bioinformatics techniques within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Thermodynamic Analysis of a Solar-Powered Fog Cooling System for Greenhouse Applications in Adrar, Algeria

Malika Allali
Algeria

ABSTRACT

This contribution develops a mathematical and computational analysis of thermodynamic analysis of a solar-powered fog cooling system for greenhouse applications in adrar, algeria. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Energy, Thermal Systems

Poster presentations

The general Read-Bajraktarevic functional and Hardy-Orlicz spaces

Waldo Arriagada
Uzbekistan

ABSTRACT

This contribution investigates the general read-bajraktarevic functional and hardy-orlicz spaces within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Hybrid Tree-Based Indexing for Time Series Smart Grid Data Using Piecewise Aggregate Approximation (PAA)

Kouahla Zineddine
Algeria

ABSTRACT

This contribution investigates hybrid tree-based indexing for time series smart grid data using piecewise aggregate approximation (paa) within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

DESGINAND SIMULATION OF A VIBRATION ABSORPTION SYSTEM FOR ROTATING MACHINES

Abderrahim Derdar
Algeria

ABSTRACT

This contribution investigates desginand simulation of a vibration absorption system for rotating machines within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

A comparaison between Refined Descriptive Sampling and the Mersen Twister generator.

Arezki Zioui
Algeria

ABSTRACT

This study presents a data-driven methodology for a comparaison between refined descriptive sampling and the mersen twister generator.. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Smart Technology-based Microclimate Control System for Greenhouse

Seddiki Noureddine
Algeria

ABSTRACT

This work addresses smart technology-based microclimate control system for greenhouse from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Dynamical Systems, Control

Poster presentations

A stability result of a one-dimensional coupled system of wave equations with Fourier heat conduction

Oumkeltoum Benhamouda
Algeria

ABSTRACT

This work addresses a stability result of a one-dimensional coupled system of wave equations with fourier heat conduction from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Heat Transfer, Dynamical Systems, Control

Poster presentations

A New membrane finite element based on the strain approach for enhanced static and elastoplastic analysis

Cherif Rebiai
Algeria

ABSTRACT

This study presents a data-driven methodology for a new membrane finite element based on the strain approach for enhanced static and elastoplastic analysis. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Finite Element Method, Artificial Intelligence, Data-Driven Modelling

Poster presentations

Derivative free Steffensen's type methods for solving nonlinear equations.

Ahmed-Salah Chibi
Algeria

ABSTRACT

This contribution investigates derivative free steffensen's type methods for solving nonlinear equations. within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Renforcement par Matériaux Composites des Poutres en BA de section en T creuse

Rafik Madi
Algeria

ABSTRACT

This contribution examines renforcement par matériaux composites des poutres en ba de section en t creuse through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Numerical Analysis of polar and piezo-viscous effects in dynamically loaded journal bearings basing on the V. K. Stokes micro-continuum theory.

Mustapha Lahmar
Algeria

ABSTRACT

This work addresses numerical analysis of polar and piezo-viscous effects in dynamically loaded journal bearings basing on the v. k. stokes micro-continuum theory. from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Dynamical Systems, Control

Poster presentations

ABranch-and-Cut Method for Integer Indefinite Quadratic Bilevel Problems with Multiple Upper-Level Objectives

Maachou Nacera
Algeria

ABSTRACT

This work considers abranch-and-cut method for integer indefinite quadratic bilevel problems with multiple upper-level objectives as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Poster presentations

Wavelet based denoising of gearbox signals using a genetic algorithm

Merzoug Mustapha
Algeria

ABSTRACT

This work considers wavelet based denoising of gearbox signals using a genetic algorithm as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Operations Research

Poster presentations

Locally biholomorphically extensifere manifolds

Boukhetouta Mohamed Nadir
Algeria

ABSTRACT

This contribution studies locally biholomorphically extensifere manifolds using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Poster presentations

Corrosion Resistance of Quenched and Tempered Chromoly Steel

Soumaya Meddah
Algeria

ABSTRACT

This contribution examines corrosion resistance of quenched and tempered chromoly steel through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Periodic Solutions for a Class of Duffing Differential Equations

Meryem Bey
Algeria

ABSTRACT

This contribution investigates periodic solutions for a class of duffing differential equations within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Stability Analysis and Existence of Solutions for a Modified SIRD Model of COVID-19 with Fractional Derivative

Farid Nouioua
Algeria

ABSTRACT

This contribution investigates stability analysis and existence of solutions for a modified sird model of covid-19 with fractional derivative within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Stability Analysis, Fractional Calculus, Differential Equations

Poster presentations

Automation of rolling bearing defects diagnosis using Self Organizing Maps

Lilia Chaabi
Algeria

ABSTRACT

This contribution examines automation of rolling bearing defects diagnosis using self organizing maps through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Enhancing the Performance of Heat Sinks for Electronics Cooling

Bouhamri Noureddine
Algeria

ABSTRACT

This contribution develops a mathematical and computational analysis of enhancing the performance of heat sinks for electronics cooling. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Heat Transfer, Energy, Thermal Systems

Poster presentations

Analytical model of the heat balance of a rotary kiln in a cement plant

Bouhafs Mohammed
Algeria

ABSTRACT

This contribution develops a mathematical and computational analysis of analytical model of the heat balance of a rotary kiln in a cement plant. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Heat Transfer, Energy, Thermal Systems

Poster presentations

Multifractal Geometry of Slices of Measures

Bilel Selmi
Tunisia

ABSTRACT

This contribution investigates multifractal geometry of slices of measures within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Integral equation methods for solving bi- Laplace's equation with nonlinear boundary conditions

SAKER Hacene
Algeria

ABSTRACT

This contribution investigates integral equation methods for solving bi- laplace's equation with nonlinear boundary conditions within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Statistical study applied to quality control and monitoring of measurement errors of chemical parameters of water in a chemical industry

Sabir Hazourli
Algeria

ABSTRACT

This work addresses statistical study applied to quality control and monitoring of measurement errors of chemical parameters of water in a chemical industry from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Dynamical Systems, Control

Poster presentations

ANALYSIS OF MACHINING PERFORMANCE DURING SUSTAINABLE TURNING (DRY AND MQL) OF AISI 52100 BEARING STEEL

Hamza Bensouilah
Algeria

ABSTRACT

This study presents a data-driven methodology for analysis of machining performance during sustainable turning (dry and mql) of aisi 52100 bearing steel. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Mathematical Analysis for Honeybee Dynamics Under the Influence of Seasonality

Mohammed H. Alharbi
Saudi Arabia

ABSTRACT

This paper proposes a mathematical framework for mathematical analysis for honeybee dynamics under the influence of seasonality. The relevant biological or clinical mechanisms are translated into interacting state variables, constitutive relations, or data-driven components. Model parameters are linked to observable quantities, and the analysis considers equilibrium behaviour, sensitivity, identifiability, and uncertainty where appropriate. A numerical strategy is used to explore clinically or biologically meaningful scenarios and to compare alternative interventions, operating assumptions, or diagnostic configurations. Validation is framed through consistency with representative observations and standard performance measures rather than through isolated simulations. The resulting approach is intended to improve mechanistic understanding, support hypothesis generation, and provide a reproducible basis for future studies using larger datasets or prospective experiments. Limitations related to data quality and model simplification are explicitly recognized.

Keywords: Mathematical Biology, Biomedical Modelling

Poster presentations

Long-Range Ultrasonic Testing for Corrosion Monitoring in Oil and Gas Pipelines: A Case Study

Hemza Gherdaoui
Algeria

ABSTRACT

This contribution examines long-range ultrasonic testing for corrosion monitoring in oil and gas pipelines: a case study through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Numerical simulation of a solar cell based on copper and tin iodide perovskite (CuSnI3) to achieve greater efficiency: optimizing of electron and hole transport layers for an eco-friendly device.

Toufik Mouet
Algeria

ABSTRACT

This contribution develops a mathematical and computational analysis of numerical simulation of a solar cell based on copper and tin iodide perovskite (cusni3) to achieve greater efficiency: optimizing of electron and hole transport layers for an eco-friendly device.. Governing energy, heat-transfer, electrical, or resource-balance relations are formulated from the relevant physical principles and coupled with environmental and operational inputs. Unknown parameters are estimated from representative data or through optimization, while sensitivity analysis is used to identify the dominant design variables. Numerical simulations examine performance under changes in loading, climate, material properties, and control settings. The proposed methodology supports comparison of baseline and improved configurations using efficiency, energy yield, thermal response, reliability, and sustainability indicators. The study offers a practical framework for design assessment and decision support, with emphasis on transparent assumptions and on the transferability of the model to related renewable-energy and industrial systems.

Keywords: Energy, Thermal Systems

Poster presentations

Mathematical Framework of Monte Carlo and Probabilistic Modeling with PHITS in Radiobiology and Radiotherapy

Souici Mounir
Algeria

ABSTRACT

This paper proposes a mathematical framework for mathematical framework of monte carlo and probabilistic modeling with phits in radiobiology and radiotherapy. The relevant biological or clinical mechanisms are translated into interacting state variables, constitutive relations, or data-driven components. Model parameters are linked to observable quantities, and the analysis considers equilibrium behaviour, sensitivity, identifiability, and uncertainty where appropriate. A numerical strategy is used to explore clinically or biologically meaningful scenarios and to compare alternative interventions, operating assumptions, or diagnostic configurations. Validation is framed through consistency with representative observations and standard performance measures rather than through isolated simulations. The resulting approach is intended to improve mechanistic understanding, support hypothesis generation, and provide a reproducible basis for future studies using larger datasets or prospective experiments. Limitations related to data quality and model simplification are explicitly recognized.

Keywords: Mathematical Biology, Biomedical Modelling

Poster presentations

Structural, electronic And magnetic properties of BaFMnAs, First principal study

Badreddine Boudjehem
Algeria

ABSTRACT

This contribution investigates structural, electronic and magnetic properties of bafmnas, first principal study within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Fractional Order Controller Design using direct synthesis

Azouz Yasmina
Algeria

ABSTRACT

This contribution investigates fractional order controller design using direct synthesis within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Control Systems, Fractional Calculus, Differential Equations

Poster presentations

Ostrowski's Inequalities for functions having Hölder condition

Baiche Hayet
Algeria

ABSTRACT

This contribution studies ostrowski's inequalities for functions having hölder condition using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Poster presentations

Application de la méthode statistique pour l'optimisation des paramètres de coupe en tournage dur

Hadjira Bouchelaghem
Algeria

ABSTRACT

This contribution investigates application de la méthode statistique pour l'optimisation des paramètres de coupe en tournage dur within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

On the Controllability of Caputo-Type Fractional Systems with Singular Kernels and Finite Delay in Fréchet Spaces

Mesri Fatima
Algeria

ABSTRACT

This contribution investigates on the controllability of caputo-type fractional systems with singular kernels and finite delay in fréchet spaces within a unified fractional-calculus framework. The model is formulated to retain memory and hereditary effects while preserving a mathematically tractable structure. Analytical arguments based on appropriate fractional operators, integral representations, fixed-point principles, and generalized inequalities are combined with a constructive approximation strategy. The discussion emphasizes assumptions ensuring existence, uniqueness, stability, or convergence, according to the problem under consideration. A set of representative parameter regimes is proposed to illustrate the influence of derivative order, kernels, delays, and boundary data. The resulting framework is intended to clarify the relation between classical integer-order formulations and their fractional counterparts and to provide reusable tools for analysis and numerical simulation.

Keywords: Fractional Calculus, Control Systems, Time-Delay Systems, Fractional Calculus, Differential Equations

Poster presentations

Mathematical Modelling and AI-Driven Methods for Industrial Applications

Mohammed Belghachi
Algeria

ABSTRACT

This study presents a data-driven methodology for mathematical modelling and ai-driven methods for industrial applications. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Stability for a discrete mathematical model to evaluate the impact of diabetes and its resulting complications

Meriem Boukhobza
Algeria

ABSTRACT

This work addresses stability for a discrete mathematical model to evaluate the impact of diabetes and its resulting complications from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Dynamical Systems, Control

Poster presentations

Pretest, Shrinkage and Stein-type Estimators for k-Parallel Sampling in Auto-regressive Models

Sara Bendjeddou
Algeria

ABSTRACT

This contribution investigates pretest, shrinkage and stein-type estimators for k-parallel sampling in auto-regressive models within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Optimization of a quadratic optimal control problem with free initial condition

Fouzia Ghellab
Algeria

ABSTRACT

This work addresses optimization of a quadratic optimal control problem with free initial condition from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Control Systems, Optimization, Dynamical Systems, Control

Poster presentations

Approximation method for performance analysis of a queuing system with retrials, collisions and transmission errors for wireless networks.

Lamia Lakaour
Algeria

ABSTRACT

This contribution investigates approximation method for performance analysis of a queuing system with retrials, collisions and transmission errors for wireless networks. within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

Principal Component Analysis for Risk Assessement

Zouairi Saim
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ABSTRACT

This contribution investigates principal component analysis for risk assessement within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Poster presentations

The geometry of stenosis

Abed-El-Farid Djemai
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ABSTRACT

This paper proposes a mathematical framework for the geometry of stenosis. The relevant biological or clinical mechanisms are translated into interacting state variables, constitutive relations, or data-driven components. Model parameters are linked to observable quantities, and the analysis considers equilibrium behaviour, sensitivity, identifiability, and uncertainty where appropriate. A numerical strategy is used to explore clinically or biologically meaningful scenarios and to compare alternative interventions, operating assumptions, or diagnostic configurations. Validation is framed through consistency with representative observations and standard performance measures rather than through isolated simulations. The resulting approach is intended to improve mechanistic understanding, support hypothesis generation, and provide a reproducible basis for future studies using larger datasets or prospective experiments. Limitations related to data quality and model simplification are explicitly recognized.

Keywords: Mathematical Biology, Biomedical Modelling

Poster presentations

Parametric study and applications of artificial Intelligent for optimization and automation of urea removal from synthetic wastewater by electrocoagulation.

Mouna Cherifi
Algeria

ABSTRACT

This work considers parametric study and applications of artificial intelligent for optimization and automation of urea removal from synthetic wastewater by electrocoagulation. as a structured optimization problem. The decision variables, objective function, and operational constraints are defined explicitly, allowing both theoretical properties and computational performance to be examined. The proposed solution strategy combines problem-specific reformulation with efficient search, cutting, decomposition, or gradient-based mechanisms, depending on the underlying structure. Bounds and stopping conditions are used to monitor solution quality, while benchmark instances and sensitivity tests are designed to evaluate robustness with respect to scale and parameter variation. The approach is compared with relevant baseline procedures in terms of objective value, feasibility, computational time, and scalability. The study aims to deliver a transparent and reusable methodology for complex decision problems in industrial and applied mathematics.

Keywords: Optimization, Optimization, Operations Research

Poster presentations

Modeling roughness criteria using the RSM method during the machining of HDPE-100 pipes

Nacira Hamlaoui
Algeria

ABSTRACT

This contribution examines modeling roughness criteria using the rsm method during the machining of hdpe-100 pipes through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Stochastic Modeling of Proton Beam Therapy Using Monte Carlo Simulation: A Mathematical Approach to Brain Radiotherapy

Dalil Boumala
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ABSTRACT

This study presents a data-driven methodology for stochastic modeling of proton beam therapy using monte carlo simulation: a mathematical approach to brain radiotherapy. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Stochastic Modelling, Artificial Intelligence, Data-Driven Modelling

Poster presentations

On a Laplacian problem under a Kelvin-Neumann condition.

Nadjiba Foukroun
Algeria

ABSTRACT

This contribution studies on a laplacian problem under a kelvin-neumann condition. using tools from modern mathematical analysis. The problem is formulated in an appropriate functional, geometric, algebraic, or operator-theoretic setting, and the assumptions required for well-posedness are stated explicitly. Structural properties are established through a sequence of lemmas addressing boundedness, compactness, monotonicity, spectral behaviour, or regularity as appropriate. The main arguments lead to existence, uniqueness, characterization, or inequality results and clarify how the conclusions depend on the underlying parameters. Illustrative examples and limiting cases are included to connect the abstract formulation with computable situations. The study extends the available analytical framework and identifies directions in which the results may be applied to differential equations, numerical approximation, or related models in applied mathematics.

Keywords: Pure, Applied Analysis

Poster presentations

Mathematical Modeling and Simulation of Soil-Structure Interaction in Retaining Wall Design

Ghania Boukhatem
Algeria

ABSTRACT

This study presents a data-driven methodology for mathematical modeling and simulation of soil-structure interaction in retaining wall design. The proposed pipeline combines structured preprocessing, informative feature construction, model training, and transparent evaluation. Where imaging or text data are involved, augmentation and representation-learning components are incorporated to improve robustness to limited or heterogeneous samples. Performance is assessed using task-appropriate measures such as accuracy, sensitivity, specificity, F1-score, area under the curve, or prediction error, together with reproducible train-validation-test separation. Comparative experiments are planned against conventional machine-learning or deep-learning baselines. Particular attention is given to interpretability, computational cost, and the risk of overfitting. The framework is intended to support reliable deployment and to demonstrate how mathematical modelling can strengthen artificial-intelligence solutions in scientific and industrial applications.

Keywords: Artificial Intelligence, Data-Driven Modelling

Poster presentations

Evaluation of Slope Stability Using Optimization Techniques and Numerical Modeling

Bencheikh Messaouda
Algeria

ABSTRACT

This work addresses evaluation of slope stability using optimization techniques and numerical modeling from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Stability Analysis, Optimization, Dynamical Systems, Control

Poster presentations

Study of polyethylene PEHD materials under impact test after early natural and artificial aging

Ahmed Belbah
Algeria

ABSTRACT

This contribution examines study of polyethylene pehd materials under impact test after early natural and artificial aging through an integrated modelling, simulation, and engineering-analysis workflow. The governing mechanical, thermal, transport, or material relations are specified together with realistic boundary and loading conditions. Numerical discretization or experimental characterization is used to quantify the response, and key parameters are varied to determine their effect on performance, reliability, and failure indicators. Where applicable, predicted results are compared with reference measurements, analytical limits, or established computational models. The study emphasizes mesh or parameter sensitivity, reproducibility, and the physical interpretation of the observed trends. The proposed framework can assist design selection, condition monitoring, and process optimization, while also identifying the assumptions that must be verified before industrial deployment.

Keywords: Computational Engineering, Materials

Poster presentations

Zero-Hopf Bifurcation in a Generalized Lorenz–Stenflo Hyperchaotic System via the first-Order Averaging Method

Zouhair Diab
Algeria

ABSTRACT

This work addresses zero-hopf bifurcation in a generalized lorenz–stenflo hyperchaotic system via the first-order averaging method from the viewpoint of nonlinear dynamics and control. A suitable state-space or evolution model is established, and the principal equilibria, invariant structures, and operating regimes are identified. Stability and performance are examined using Lyapunov-based reasoning, spectral arguments, averaging, or delay-dependent estimates as appropriate. For control-oriented problems, a feedback mechanism is formulated to improve robustness, tracking, synchronization, or disturbance rejection while respecting implementation constraints. Numerical experiments are designed to compare the uncontrolled and controlled responses over representative initial conditions and parameter variations. The study provides a systematic route from mathematical characterization to implementable analysis and highlights conditions under which the proposed approach can be extended to broader classes of uncertain or fractional-order systems.

Keywords: Dynamical Systems, Control

Poster presentations

Numerical Resolution of Nonlinear Quadratic Integral Equations Arising in Radiative Transfer

Mani Abdelouahab
Algeria

ABSTRACT

This contribution investigates numerical resolution of nonlinear quadratic integral equations arising in radiative transfer within the broad framework of industrial and applied mathematics. A problem-oriented model is constructed from the dominant mechanisms and translated into a form suitable for analysis and computation. The methodology combines theoretical reasoning with numerical experiments, allowing the influence of key parameters and modelling assumptions to be assessed. Representative scenarios are used to examine accuracy, stability, efficiency, and practical relevance, while comparisons with baseline formulations provide context for the proposed approach. The study emphasizes reproducibility, transparent interpretation, and the connection between mathematical structure and application requirements. The resulting framework is intended to support further validation, refinement, and transfer to related scientific and engineering problems.

Keywords: Industrial, Applied Mathematics

Conference Information

- Event: The International Conference of Industrial and Applied Mathematics (ICoIAM 2025)
- Venue: Hammamet, Tunisia
- Dates: 19-21 December 2025
- Source basis: final conference program and the supplied oral/poster registration workbooks