IWANA 2022

Book of ABSTRACTS

5-6 September 2022

Bangsaen Heritage Hotel,
Chonburi, Thailand

International Workshop on *Applied Nonlinear Analysis*

Organized by: Working Group on Applied Nonlinear Analysis
Supported by: Center of Excellence in Theoretical and Computational Science

Book of Abstracts

IWANA2022

The 3rd International Workshop on Applied Nonlinear Analysis

Bangsaen Heritage Hotel, Bangsean, Chonburi, Thailand

September 5–6, 2022

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Forward

In 2022, the International Workshop on Applied Nonlinear Analysis (IWANA) has came into its third iterate. The first of its series was named differently (IWNAA) and was organized in Granada, Spain. The second workshop took place in Chonburi, Thailand, and was renamed into IWANA.

The IWANA 2022 is organized again in Chonburi, Thailand, on 5–6 September 2022. Due to the COVID-19 situation worldwide, the event is organized in a hybrid platform — limited number of selected participants are allowed on site and the remaining are asked to enjoy the workshop remotely. This year, we are honored to host several talks by renowned mathematicians from all over the world, namely

- Professor Somyot Plubtieng from Naresuan University, Thailand.
- Professor Yeol Je Cho from Gyeongsang National University, South Korea.
- Professor Mohamed Amine Khamsi from Khalifa University, United Arab Emirates.
- Professor Vasile Berinde from Technical University of Baia Mare, North University Center at Baia Mare, Baia Mare, Romania.
- Professor Jong Kyu Kim from Kyungnam University, South Korea.
- Professor Suthep Suantai from Chiangmai University, Thailand.

There are also two very special celebrations at the IWANA 2022 – (1) The 100 years of the Banach Contraction Principle, and (2) The 60th birthday and retirement of Professor Somyot Plubtieng.

Banach Contraction Principle is the founding theorem of what we know today as the metric fixed point theory. It simply states that *every contraction map defined on a complete metric space has a unique fixed point.* Apart from that, the theorem also provides an iterative scheme to reach that unique fixed point as well as the error estimation. In the original work of Banach, the fixed point equation is an abstract realization of the Cauchy problem. Afterwards, many extensions of the Banach Contraction Principle are obtained and several more applications were found until today.

Professor Somyot Plubtieng is one of the *BIG THREE S.'s*, alongside with Professor Sompong Dhompongsa and Professor Suthep Suantai, who have laid foundation of fixed point theory, as well as modern mathematical research, in Thailand. He has been inventing several important results in the area of fixed point theory, variational

inequality, variational analysis, and optimization. Moreover, he had trained several young mathematicians to be able to produce meaningful researches and writing successful research proposals.

We wish everyone would have a great time enjoying mathematics and Thai beach at the IWANA 2022.

Best regards,
The organizers of IWANA2022.

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General Information

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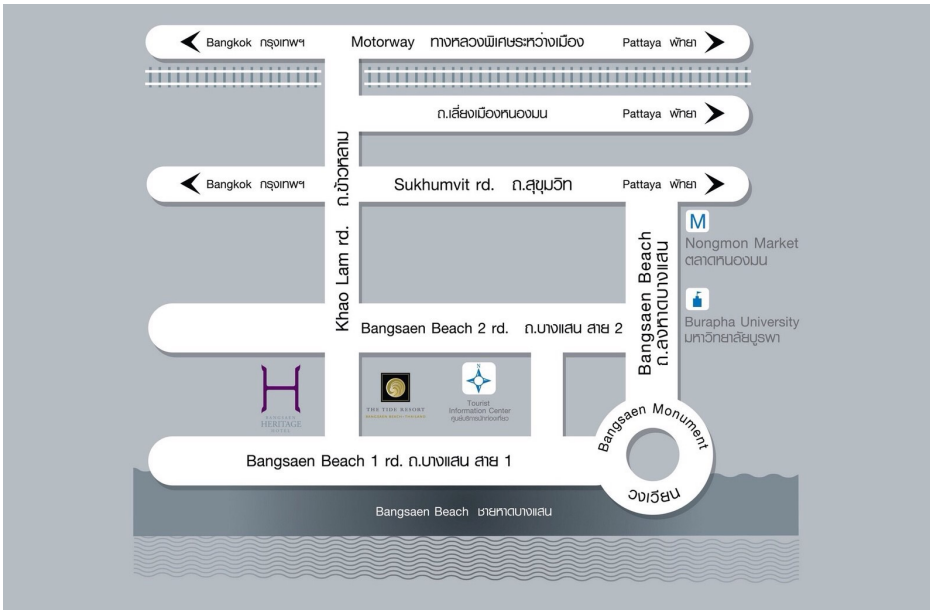
Website: https://www.bs-heritagehotel.com



Official Language The official language of the conference is English. All the presentations will be made in English. No arrangements are available for simultaneous translation.

Registration Regular and Student participants who made registration will be provided with a conference kit. Lunches and refreshments during the conference are also available. All the participants can attend the conference banquet without additional fees.

Name Tag Badges All the participants will be issued with a name tag badge at registration. You are always requested to wear the badge; it is your entrance ticket to all conference sessions and other arrangements. For loss of badge, contact the Information Desk.

Messages A message board will be located near the Information Desk.

Presentation Detail

- There are four kinds of lectures in the technical program; keynote lectures, invited lectures and contributed talks in the regular sessions. Organized sessions focusing on specific topics are located in regular sessions.
- A keynote lecture has 30 min each, an invited lecture have 20 min each and other talks have 15 min each including preparation time, questions and answers.
- If you find your name as a chairperson of a session, you are requested to go to the room and preside the session.
- A video projector (for PC) will be provided in each session. VGA connection is available. The speakers need to bring their own PC if necessary. For further requirements, please ask the Information Desk.

Lunch Lunch tickets will be provided at the registration. You can use them for the exchange of the meal at the Sila restaurant.

Smoking Policy Participants are kindly requested to refrain from smoking inside the building including all the session rooms. Smoking is only allowed in the designated smoking area.

Dietary Requirements/Disability Assistance If you have special dietary requirements and/or you require disability assistance, please contact the Information Desk staff at any time.

Wi-Fi Connection Free Wi-Fi connection is available at the conference rooms.

Banquet The banquet venue for IWANA2022 is “Saensuk 1–2” in the Bangsean Heritage Hotel. All participants can attend the banquet without additional charge.

Schedule

IWANA2022 Program Timetable

Monday, September 5, 2022.

Venue: Bangsaen Heritage Hotel

Times	Events
08.00 – 09.00	Registration
09.00 – 09.10	Opening Ceremony
09.10 – 09.40	Honorary Lecture (S. Plubtieng)
09.40 – 09.55	Coffee Break
09.55 – 12.00	Parallel Session 1
12.00 – 13.00	Lunch
13.00 – 13.30	Keynote Lecture (J.K. Kim)
13.30 – 15.05	Parallel Session 2
15.05 – 15.20	Coffee Break
15.20 – 16.40	Parallel Session 3
16.45 – 17.15	Keynote Lecture (V. Berinde)
18.00 – 18.30	Special Discussion (S. Dhompongsa || S. Suantai || S. Plubtieng)
18:30	Banquet Party

Tuesday, September 6, 2022.

Venue: Bangsaen Heritage Hotel

Times	Events
09.00 – 09.30	Keynote Lecture (S. Suantai)
09.30 – 10.50	Parallel Session 4
10.50 – 11.00	Coffee Break
11.00 – 12.20	Parallel Session 5
12.20 – 13.30	Lunch
13.30 – 14.00	Keynote Lecture (Y.J. Cho)
14.00 – 14.15	Best Presentation Award Ceremony
14.15 – 14.45	Keynote Lecture (M.A. Khamsi)
14.45 – 15.00	Closing Ceremony

Monday, September 5, 2022.

Honorary Lecture | 09.10 – 09.40

Chair : Suthep Suantai
Somyot Plubtieng
▷ Modified inertial subgradient extragradient algorithm for solving bilevel system of equilibrium problems

Parallel Session 1 | 09.55 – 12.00

Room 1 : Differential Equation I
Chair : Thongchai Botmart

09.55 – 10.15 **THONGCHAI BOTMART (INVITED)**
▷ Pinning sampled-data control for function projective synchronization of neural networks with hybrid couplings and time-varying delays

10.15 – 10.30 **Arthit Hongsri**
▷ Extended dissipative analysis for sampled-data synchronization of complex dynamical networks with coupling time-varying delays

10.30 – 10.45 **Saqib Murtaza**
▷ Numerical analysis of fractal fractional non-linear electro osmotic flow with cadmium telluride nanoparticles

10.45 – 11.00 **Sunisa Luemsai**
▷ Improved extended dissipativity results for T-S fuzzy neural networks with interval time-varying delay

11.00 – 11.15 **Phichsinee Khongja**
▷ New guaranteed cost control for exponential stability of nonlinear system with mixed time-varying delays via feedback control

11.15 – 11.30 **Peerapongpat Singkibud**
▷ New exponential passivity analysis of neutral-type neural networks with distributed time-varying delays

11.30 – 11.45 **Jitsin Piyawatthanachot**
▷ New stability criterion for linear system with mixed time-varying delays and nonlinear perturbations

Room 2 : Fixed Point Theory I
Chair : Wutiphol Sintunavarat

09.55 – 10.15 **WUTIPHOL SINTUNAVARAT (INVITED)**
▷ On Thai mathematician's approaches for solving linear/nonlinear problems with the fixed point method

10.15 – 10.30 **Ajay Kumar Chaudhary**
▷ Fixed point result by using compatible mapping of type P in menger space

10.30 – 10.45 **Sunisa Somsit**
▷ Quasi-nonexpansive selections and convergence theorems for multivalued nonexpansive mappings in Banach spaces

10.45 – 11.00 **Kasamsuk Ungchittrakool**
▷ Accelerated Mann-type iterative algorithm for solving image restoration problems

11.00 – 11.15 **Thanatporn Bantaojai**
▷ Sadovski-Darbo fixed point theorem for $\psi-$Riemann-Liouville fractional differential equation with Riemann-Stielties integral conditions

Keynote Lecture | 13.00 – 13.30

Chair : Yeol Je Cho
Jong Kyu Kim
▷ Gap functions for general set-valued nonlinear variational-hemivariational inequalities

Parallel Session 2 | 13.30 – 15.05

Room 1 : Applied Mathematics I
Chair : Rabian Wangkeeree

13.30 – 13.50 **ANTONIO FRANCISCO ROLDAN LOPEZ DE HIERRO (INVITED)**
▷ On the approximation of fuzzy sets by fuzzy numbers

13.50 – 14.05 **Vipavee Damminsed**
▷ Laplacian twin support vector machine with Pinball loss for semi-supervised classification

14.05 – 14.20 **Shigeo Akashi**
▷ A Relation between Hilbert's 13th problem and data compression problem

14.20 – 14.35 **Harish Chandra Brhaandari**
▷ Graph interpretation and feature extraction strategy for electroencephalogram signal classification

Room 2 : Differential Equation II
Chair : Jessada Tariboon

13.30 – 13.50 **JESSADA TARIBOON (INVITED)**
▷ Fractional (p, q)-difference equations and boundary value problems

13.50 – 14.05 **Janejira Tranthi**
▷ A novel criteria on exponentially passive analysis for Takagi-Sugeno fuzzy of neutral dynamic system with various time-varying delays

14.05 – 14.20 **Issaraporn Khonchaiyaphum**
▷ Finite-time passivity analysis of neutral-type neural networks with mixed time-varying delays

14.20 – 14.35 **Chalida Phanlert**
▷ Finite-time mixed H_∞/passivity criteria for generalized neural networks with mixed interval time-varying delays

14.35 – 14.50 **Chantapish Zamart**
▷ Finite-time stability analysis of generalized neural networks with mixed interval time-varying delays via new integral inequality

14.50 – 15.05 **Charuwat Chantawat**
▷ Finite-time synchronization control for coronary artery chaos system with state and input time-varying delays

Parallel Session 3 | 15.20 – 16.40

Room 1 : Fixed Point Theory II
Chair : Dhananjay Gopal

15.20 – 15.40 **DHANANJAY GOPAL (INVITED)**
▷ Search of minimal metric structure in the context of fixed point theorem

15.40 – 15.55 **Sachiko Atsushiba**
▷ Convergence theorems for monotone nonexpansive mappings in ordered uniformly convex Banach spaces

15.55 – 16.10 **Dang-Khoa Nguyen**
▷ Fast Krasnosel'skiĭ-Mann algorithm with a convergence rate of the fixed point iteration of $o(1/k)$

16.10 – 16.25 **Jayesh D Savaliya**
▷ Some discussion on generalizations of metric spaces in fixed point perspective

16.25 – 16.40 **Sani Salisu**
▷ Properties of enriched nonexpansive mappings in Hadamard spaces

Room 2 : Optimization I
Chair : Narin Petrot

15.20 – 15.40 **OVIDIU BAGDASARL (INVITED)**
▷ One certain generalised convexity concepts and related local-global type properties

15.40 – 15.55 **Salihu Nasiru**
▷ A hybrid Hestenes-Stiefel and Dai-Yuan minimization with application in three degrees of freedom real-time motion control robotic model

15.55 – 16.10 **Ibrahim Arzuka**
▷ Three-term conjugate gradient method for solving variational inequality problems over the fixed point set of nonexpansive mapping

Keynote Lecture | 16.45 – 17.15

Chair : Mohamed Amine Khamsi
Vasile Berinde
▷ From Banach contractions to almost contractions, enriched contractions and beyond

Special Discussion | 18.00 – 18.30

Chair : Poom Kumam
Sompong Dhompongsa || Suthep Suantai || Somyot Plubtieng

Tuesday, September 6, 2022.

Keynote Lecture | 09.00 – 09.30

Chair : Jamnian Nantadilok
Suthep Suantai
▷ An accelerated convex optimization algorithm with line search and applications in machine learning

Parallel Session 4 | 09.30 – 10.50

Room 1 : Fixed Point Theory III
Chair : Juan Martínez-Moreno

09.30 – 09.50	**JUAN MARTINEZ-MORENO (INVITED)** ▷ Progressive iterative approximation methods
09.50 – 10.05	**Thanittha Kowan** ▷ Modified inertial algorithms for inclusion problems
10.05 – 10.20	**Kiattisak Rattanaseeha** ▷ A new iterative methods for a finite family of the split generalized equilibrium problem and fixed point problem
10.20 – 10.35	**Dawrawee Makmuang** ▷ A regularized stochastic Nesterov's accelerated quasi-newton method with applications
10.35 – 10.50	**Abubakar Bala Abubakar** ▷ A hybrid approach for finding approximate solutions to constrained nonlinear monotone operator equations with applications

Room 2 : Optimization II
Chair : Kanit Mukdasai

09.30 – 09.50	**KANIT MUKDASAI (INVITED)** ▷ Robust stability analysis for discrete-time neural networks with mixed time-varying delays via a new summation inequality
09.50 – 10.05	**Muhammad Ramzan** ▷ Heat transfer analysis of the mixed convective flow of magneto-hydrodynamic hybrid nanofluid past a stretching sheet with velocity and thermal slip conditions

10.05 – 10.20 **Muhammad Arif**
▷ Heat transfer analysis of radiator using different shaped nanoparticles water-based ternary hybrid nanofluids with applications: a fractional model

10.20 – 10.35 **Boonyachat Meesuptong**
▷ H_∞ performance for uncertain neutral system with mixed time-varying delays

Parallel Session 5 | 11.00 – 12.20

Room 1 : Geodesic Spaces
Chair : Bancha Panyanak

11.00 – 11.20 **BANCHA PANYANAK (INVITED)**
▷ Endpoint theorems for some generalized multivalued nonexpansive mappings

11.20 – 11.35 **Jamnian Nantadilok**
▷ On the existence of fixed points of quasi-nonexpansive multimaps in a CAT(0) space

11.35 – 11.50 **Kazuya Sasaki**
▷ Conditions for perturbations to define the resolvent of the equilibrium problem on geodesic spaces

11.50 – 12.05 **Adamu Yusuf Inuwa**
▷ Equilibrium problems and proximal algorithm in monotone vector field

12.05 – 12.20 **Yasunori Kimura**
▷ Iterative schemes converging to a fixed point of a mapping on a complete geodesic space

Room 2 : Applied Mathematics II
Chair : Kamsing Nonlaopon

11.00 – 11.20 **OSVALDO MENDEZ (INVITED)**
▷ Physical applications of variable exponent spaces: Kirchoff's equation for the elastic string

11.20 – 11.35 **Bharat Raj Wagle**
▷ Closed queueing network analysis of vehicle sharing in a city

11.35 – 11.50 **Patcharapa Srichok**
▷ Levitin-Polyak well-posedness for generalized $(\eta, g, \varphi)-$mixed vector variational-type inequality problem

Keynote Lecture | 13.30 – 14.00

Chair : Jong Kyu Kim
Yeol Je Cho
▷ Projection methods for solving variational Inequality problems in Hilbert spaces

Keynote Lecture | 14.15 – 14.45

Chair : Somyot Plubtieng
Mohamed Amine Khamsi
▷ Linear functional analysis in: metric spaces

Abstracts of Keynote Talks

Gap functions for general set-valued nonlinear variational-hemivariational inequalities

Jong Kyu Kim

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Abstract

The objective of this talk is to study the general set-valued nonlinear variational-hemivariational inequalities and investigate the gap function, regularized gap function and Moreau-Yosida type regularized gap functions for the general set-valued nonlinear variational-hemivariational inequalities. And also, we discuss the error bounds for such inequalities using the characteristic of the Clarke generalized gradient, locally Lipschitz continuity, inverse strong monotonicity and Hausdorff Lipschitz continuous mappings.

Acknowledgements: Thanks for the invitation me as a keynote speaker at The 2nd International Workshop on Applied Nonlinear Analysis 2022" (IWANA 2022) which will be held as a hybrid (onsite + online) conference at Bang San Beach, to the Organizing committee of IWANA 2022.

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Linear functional analysis in: metric spaces

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Abstract

As for the linear case, compactness for the strong topology is very restrictive. Since the beginning of the fixed point theory, weak-compactness offered an acceptable alternative in Banach spaces. But when we deal with metric spaces, this natural extension is no longer easy to implement. One has to go back to the linear case and investigate the weak-topology with a new eye. In this talk, I will share some of the ideas of how to extend concepts of linear nature to nonlinear spaces, i.e., metric spaces.

References

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Short-bio: Dr. Mohamed A. Khamsi graduated from the École Polytechnique, Paris, France. He completed his PhD at the Pierre-et-Marie-Curie University, Paris, France. His research interests include Nonlinear Functional Analysis, Fixed Point Theory, Logic Programming, Discrete Mathematics, and Internet Mathematics Education. Dr. Khamsi is considered one of the world experts on Metric Fixed Point Theory.

Modified inertial subgradient extragradient algorithm for solving bilevel system of equilibrium problems

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Abstract

In this talk, we propose the inertial subgradient extragradient algorithms for solving bilevel system equilibrium problems in real Hilbert spaces. The algorithm can be used without the prior knowledge of the Lipschitz constant of the involving bifunction and only compute the minimizetion of strongly bifunctions onto the feasible set is required. Under suitable conditions, we obtain strong convergence theorems of the our algorithms. Finally, some numerical examples are presented to show the efficiency of the suggested algorithms.

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An accelerated convex optimization algorithm with line search and applications in machine learning

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Abstract

In this paper, we introduce a new line search technique, then employ it to construct a novel accelerated forward–backward algorithm for solving convex minimization problems of the form of the summation of two convex functions in which one of these functions is smooth in a real Hilbert space. We establish a weak convergence to a solution of the proposed algorithm without the Lipschitz assumption on the gradient of the objective function. Furthermore, we analyze its performance by applying the proposed algorithm to solving classification problems on various data sets and compare with other line search algorithms. Based on the experiments, the proposed algorithm performs better than other line search algorithms.

Acknowledgements This research has received funding support from the NSRF via the Program Management Unit for Human Resources & Institutional Development, Research and Innovation (Grant Number B05F640183). This research was also supported by Chiang Mai University.

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From Banach contractions to almost contractions, enriched contractions and beyond

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Abstract

One hundred years ago, in 1922, Banach published his seminal paper [1], where, amongst many other fundamental results, it has been stated the first version of the contraction mapping principle, commonly called the Picard-Banach or Banach fixed point theorem. This moment marked the inception of the metric fixed point theory which afterwards developed in an extraordinary impressive way in many theoretical and applicative directions.

The main aim of the present paper is to survey some fixed point results for some classes of contractive type mappings originating from Banach fixed point theorem, including *almost contractions* ([2], [3], [4], [5], [7]), *enriched contractions* ([8], [9], [10], [11], [12], [13], [6]) and many other related ones.

Acknowledgements

We dedicate this paper to Professor Emeritus Ioan A. Rus, our PhD supervisor, on the occasion of his 86th anniversary, with love and gratefulness for introducing and guiding us in the wonderful world of FIXED POINT THEORY.

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Projection methods for solving variational inequality problems in Hilbert spaces

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Abstract

In this talk, we consider the following:

(1) new projection-type methods for solving variational inequality problems involving a monotone and L-Lipschitzian continuous operator in Hilbert spaces. Only one projection in the method is used per each iteration.

(2) some strong convergence theorems for the proposed method under suitable conditions on control parameters by using the regularization technique.

(3) some numerical experiments comparing the proposed method with some other methods given by some authors.

(4) some remarks on the convergence rate of some algorithms given by some authors.

Abstracts of Invited Talks

On the approximation of fuzzy sets by fuzzy numbers

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Abstract

A fuzzy set is a mapping that associates to each element of a classical set X a real number in the interval $[0, 1]$ which is interpreted as its membership degree for belonging to the fuzzy set. A fuzzy number of the real line is a fuzzy set on the family of all real numbers satisfying certain properties. Fuzzy numbers are algebraic generalizations of the notion of real number to a uncertain setting. Many techniques are successfully applied by employing fuzzy numbers, but such techniques cannot be applied for general fuzzy sets, unless they are very similar to fuzzy numbers. Then, it is interesting to consider a procedure in which fuzzy sets are approached by fuzzy numbers, especially in the cases in which the fuzzy sets are reasonably similar to fuzzy numbers. In this work we introduce a novel methodology to carry out such approximation, and we describe some of their main properties.

Acknowledgements

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Endpoint theorems for some generalized multivalued nonexpansive mappings

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Abstract

The concept of endpoints for multi-valued mappings is an important concept which lies between the concept of fixed points for single-valued mappings and the concept of fixed points for multi-valued mappings. The existence of endpoints for some generalized nonexpansive mappings in Banach spaces is studied. Weak and strong convergence theorems of several iterations for such kinds of mappings are also discussed.

Search of minimal metric structure in the context of fixed point theorem

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Abstract

In this talk, we discuss about some recently introduced metric spaces and corresponding topological properties in the realm of fixed point. Finally, we demonstrate what could be the minimal metric structure to prove fixed point theorem for contractive type mappings.

Acknowledgements

I would like to thank Administration of GGV Bilaspur and the working group of IWANA for the support.

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Fractional (p,q)-difference equations and boundary value problems

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Abstract

In this talk, some properties of fractional (p,q)-calculus are discussed. Fractional (p,q)-difference equations with boundary conditions are presented. Some examples are also shown the advantage of this study.

Acknowledgements

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Progressive iterative approximation methods

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Abstract

Geometric iteration methods constitute a class of iterative methods for solving linear equations in linear algebra. Since their origin, they have been widely used in academic research and engineering practices in geometric design and related fields, especially for their excellent shape and geometric properties. These iteration techniques achieved better results in addressing traditional geometric design problems such as offset curves, degree reduction, and approximating polynomials to rational curves and surfaces and others.

Among these techniques is the progressive iterative approximation method (PIA) proposed by Lin et al. The PIA is a linear iterative interpolation algorithm, which can be viewed as a dynamic algorithm that finds the closest points to the data points to be interpolated on the iterative curve or surface. The main objective of this presentation is to describe the PIA method and its variants.

Robust stability analysis for discrete-time neural networks with mixed time-varying delays via a new summation inequality

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Abstract

This paper uses our rebuilt summation inequality to investigate the robust stability analysis issue for discrete-time neural networks that incorporate interval time-varying leakage, discrete and distributed delays. The summation inequality plays an important role in the creation of delay-dependent criteria for discrete-time systems with time-varying delay, as well as in the development of other delay-dependent criteria. It is a novelty of this study to consider a new inequality, which makes it less conservative than the well-known Jensen inequality, and use it in the context of discrete-time delay systems. Using a combination of Lyapunov-Krasovskii stability theory, coefficient matrix decomposition technique, mobilization of zero equation, mixed model transformation, and reciprocally convex combination, new stability criteria that depend on the time delay range are obtained in terms of linear matrix inequalities (LMIs) for computing the allowable maximum admissible upper bound of the delay-range. With the assistance of the LMI Control toolbox in MATLAB, numerical examples are provided to demonstrate the validity and efficiency of the theoretical findings of this research.

Acknowledgements

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Physical applications of variable exponent spaces: Kirchoff's equation for the elastic string

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Abstract

We present examples of the use of variable exponent Lebesgue spaces in the solution of concrete physical problems. Special attention will be given to Kirchhoff's equation for an elastic string.

Acknowledgements
Your acknowledgements goes here.

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One certain generalised convexity concepts and related local-global type properties

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Abstract

Many types of generalized convex functions are known in the literature, each having useful properties. For example, for real-valued functions we know that:

• the semistrict quasiconvexity ensures the "*local min - global min*" property, i.e., every local minimum point is a global minimum point;

• the explicit quasiconvexity ensures a "*local max - global min*" property, namely every local maximum point is a global minimum point if it belongs to the intrinsic core of the function's domain.

We show that such "local min - global min" and "local max - global min" type properties can be extended and unified by a single general local-global extremality principle for certain generalized convex vector-valued functions with respect to two proper subsets of the outcome space. In particular, we recover several local-global properties concerning classical vector/multicriteria optimization, and then explore the relationships between various classes of generalized convex functions.

Acknowledgements

I would like to thank Professor Nicolae Popovici for introducing me to this subject.

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Pinning sampled-data control for function projective synchronization of neural networks with hybrid couplings and time-varying delays

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Abstract

This paper is concerned with the dissipative problem based pinning sampled-data control scheme. We investigate the problem for function projective synchronization of neural networks with hybrid couplings and time-varying delays. The main purpose is focused on designing a pinning sampled-data function projective synchronization controller such that the resulting function projective synchronization neural networks are stable and satisfy a strictly H_∞, $\mathrm{L}_2 - \mathrm{L}_\infty$, passivity and dissipativity performance by setting parameters in the general performance index. It is assumed that the parameter uncertainties are norm-bounded. By construction of an appropriate Lyapunov-Krasovskii containing single, double and triple integrals, which fully utilize information of the neuron activation function and use refined Jensen's inequality for checking the passivity of the addressed neural networks are established in linear matrix inequalities (LMIs). This result is less conservative than the existing results in literature. It can be checked numerically using the effective LMI toolbox in MATLAB. Numerical examples are provided to demonstrate the effectiveness and the merits of the proposed methods

AcknowledgementsThis research received funding support from the NSRF via the Program Management Unit for Human Resources and Institutional Development, Research and Innovation.

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On Thai mathematician's approaches for solving linear/nonlinear problems with the fixed point method

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Abstract

Nowadays, there are various methods for solving linear/nonlinear problems. However, due to the limitation of each method, they cannot be applied for solving all linear/nonlinear problems. This talk aims to present new techniques of Thai mathematicians to solve linear/nonlinear problems using various fixed point results.

Abstracts of Contributed Talks

A hybrid approach for finding approximate solutions to constrained nonlinear monotone operator equations with applications

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Abstract

In this work, a hybrid approach technique incorporated with three-term conjugate gradient (CG) method is proposed to solve constrained nonlinear monotone operator equations. The search direction is defined such that it is close to the one obtained by the memoryless Broyden-Fletcher-Goldferb-Shanno (BFGS) method. Independent of the line search, the search direction possess the sufficient descent and trust region properties. Furthermore, the sequence of iterates generated converge globally under some appropriate assumptions. In addition, numerical experiments is carried out to test the efficiency of the proposed method in contrast with existing methods. Finally, the applicability of the proposed method in compressive sensing is shown.

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Equilibrium problems and proximal algorithm in monotone vector field

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Abstract

In this work, equilibrium problems and their regularized problems were studied under the setting of monotone vector field. The solution to the regularized problem is represented in terms of resolvent operators. We construct the proximal algorithm based on this regularization and give convergence analysis adequately.

Acknowledgements

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Extended dissipative analysis for sampled-data synchronization of complex dynamical networks with coupling time-varying delays

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Abstract

This research addresses the problem of extended dissipative analysis for complex dynamical networks with coupling delays with a sampled-data control scheme. Firstly, we use the input delay method and combine it with a time-dependent Lyapunov functional, which can fully use the sampling period's information. Secondly, novel sufficient synchronization criteria are formulated by applying Jensen's inequality, Wirtinger's integral inequality, new integral inequalities, free-weighting matrix technique, and convex combination method. Moreover, we extend the criteria to the extended dissipative analysis, which encompasses $\mathrm{L}_2 - \mathrm{L}_\infty$, H_∞, passivity, and dissipativity in a unified framework. These conditions can exhibit in Linear matrix inequalities (LMIs), which can solve with Matlab software. Finally, two numerical examples demonstrate our method's effectiveness and less conservatism.

Acknowledgements

The first author was supported by the Science Achievement Scholarship of Thailand (SAST)

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Closed queueing network analysis of vehicle sharing in a city

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Abstract

Vehicle sharing is an immense issue in the world from the point of view of environmental protection, traffic management, and economics. Our study deals with the construction of a closed queueing network with a finite number of nodes and vehicles that provide the service to the riders. The customer's average arrival and service rate are provisioned to be heterogeneous on a first-come-first-served basis. Arrivals of the customers in the nodes are taken to be Poisson and the customer's service in exponential fashion. With the help of the transition diagram under study, finite difference equations have been set up, which have been solved explicitly to obtain the probability of individual state conditions of vehicles. Moreover, the performance of the network's product form is obtained by using the Gorden and Newell theorem of closed queueing networks. Some numerical results with the help of MATLAB software have also been computed to show the validity and the applicability of the model under study.

Acknowledgements

I would like to offer my special thanks to the Department of Mathematics, School of Sciences, Kathmandu University where I got enrollment for PhD study, similarly I would like to express my very great appreciation to Pokhara University, Nepal who provides me with study leave and I am particularly grateful to my supervisor Prof Dr. R P Ghimire for his regular advice and motivation in my study.

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H_∞ performance for uncertain neutral system with mixed time-varying delays

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Abstract

This research investigates the exponential stability analysis and H_∞ performance for a neutral system with interval time-varying discrete, neutral, and distributed delays, and nonlinear uncertainties. The uncertainties under consideration are nonlinear time-varying parameter perturbations. Based on Jensen's integral inequality, Wirtinger-base integral inequality, Leibniz-Newton fomula, Peng-Park's integral inequality, decomposition matrix technique, utilization of zero equation and the appropriate Lyapunov-Krasovskii functional (LKF), new delay-range-dependent sufficient conditions for the H_∞ performance with exponential stability of the system are established in terms of linear matrix inequalities. Moreover, we present the improved delay-range-dependent exponential stability criterion of the system with discrete, neutral, and distributed time-varying delays, and nonlinear uncertainties. A Numerical example is given to illustrate the effectiveness of the proposed method.

Acknowledgements

The first author was supported by the Science Achievement Scholarship of Thailand (SAST).

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Finite-time mixed H_∞/passivity criteria for generalized neural networks with mixed interval time-varying delays

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Abstract

In this research, we investigate the finite-time mixed H_∞/passivity for generalized neural networks with interval discrete and distributed time-varying delays. It is noted that this is the first time for studying in the combination of H_∞, passivity, and finite-time boundedness. Based on an appropriate Lyapunov-Krasovskii function (LKF) and estimating the bound of time derivative in LKF with the use of Jensen's integral inequality, an extended single and double Wirtinger's integral inequality, and a new triple integral inequality are derived in the form of linear matrix inequalities (LMIs). Finally, five numerical examples are given to illustrate the effectiveness of the obtained results.

Acknowledgements

The first author was supported by the Science Achievement Scholarship of Thailand (SAST).

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Finite-time stability analysis of generalized neural networks with mixed interval time-varying delays via new integral inequality

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Abstract

This research presents new sufficient conditions of finite-time stability for generalized neural networks (GNNs) with mixed interval time-varying delays to achieve the improved stability criterion. We also propose a new integral inequality with an exponential function to estimate the derivative of the Lyapunov-Krasovskii functional (LKF). Moreover, the new integral inequality covers the well-known Wirtinger's inequality. Finally, we present a numerical example to show the advantages of our obtained methods. The example can apply continuous time-varying delays that do not need to be differentiable.

Acknowledgements

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Finite-time synchronization control for coronary artery chaos system with state and input time-varying delays

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Abstract

This is the first time for studying the issue of finite-time synchronization control for the coronary artery chaos system (CACS) with state and input time-varying delays. By constructing the Lyapunov-Krasovskii functional (LKF) is derived for finite-time stability criteria of CACS with interval and continuous differential time-varying delays. We use Wirtinger-based integral inequality to evaluate the upper bound of the time derivative of the LKF. We apply the single integral form and the double integral form of the integral inequality, according to Wirtinger-based integral inequality, to ensure that the feedback controller for synchronization has good performance with disturbance and time-varying delay. The new sufficient finite-time stability conditions have appeared in the form of linear matrix inequalities (LMIs). Numerical checks can be performed using the LMI toolbox in MATLAB. A numerical example is presented to demonstrate the success of the proposed methods. This resultant is less conservative than the resultants available in the previous works.

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Fixed point result by using compatible mapping of type P in menger space

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Abstract

Menger Space is one of the important generalizations of metric space introduced by Austrian Mathematician Karl Menger [3] in 1942. The study of this space expanded rapidly after pioneer work of B. Schweizer and A. Sklar [6] in 1960. In 1972, V.M. Sehgal and A.T. Bharucha Reid [5] had introduced contraction mapping in probabilistic version as generalization of Banach contraction principle that was given by S. Banach [1] in 1922 in metric space. In 1991, S.N. Mishra [4] first extended the notion of compatibility in probabilistic metric space as G. Jungck [2] introduced it in Metric space. After that so many researchers have introduced different compatible mappings in Menger space for fixed point results. The objective of paper is to discuss on Compatible Mapping of type P and a common fixed point theorem under this condition in Menger space with suitable example.

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Fast Krasnosel'skiĭ-Mann algorithm with a convergence rate of the fixed point iteration of $o(1/k)$

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Abstract

The Krasnosel'skiĭ-Mann (KM) algorithm is the most fundamental iterative scheme designed to find a fixed point of an averaged operator in the framework of a real Hilbert space, since it lies at the heart of various numerical algorithms for solving monotone inclusions and convex optimization problems. We enhance the Krasnosel'skiĭ-Mann algorithm with Nesterov's momentum updates and show that the resulting numerical method exhibits a convergence rate for the fixed point residual of $o\left(\frac{1}{k}\right)$ while preserving the weak convergence of the iterates to a fixed point of the operator. Numerical experiments illustrate the superiority of the resulting so-called Fast KM algorithm over various fixed point iterative schemes, and also its oscillatory behavior, which is a specific of Nesterov's momentum optimization algorithms.

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A regularized stochastic Nesterov's accelerated quasi-newton method with applications

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Abstract

The stochastic Broyden-Fletcher-Goldfarb-Shanno (BFGS) method has effectively solved strongly convex optimization problems. However, this method frequently encounters the near-singularity problem of the Hessian. Additionally, obtaining the optimal solution necessitates a long convergence time. In this paper, we present a Regularized Stochastic Nesterov's Accelerated Quasi-Newton method that combines Nesterov acceleration with a novel momentum coefficient to effectively accelerate convergence speed and avoid the near-singularity problem of the Hessian update in the stochastic BFGS method. Moreover, we show the almost sure convergence of the generated subsequence of iterates to an optimal solution of the strongly convex optimization problems. Finally, experiments on various data sets are conducted to verify the efficacy of the proposed method.

Key worlds

Strongly convex optimization, Nesterovs accelerated gradient, Quasi-Newton method, Momentum coefficient, Support vector machine.

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Graph interpretation and feature extraction strategy for electroencephalogram signal classification

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Abstract

Electroencephalogram (EEG) is a medical test to record brain activities through electrodes in the scalp. Doctors and medical experts use these signals to diagnose different Neurological Disorders (NDs). According to WHO, every single person in a six people are suffering from some sorts of NDs. However, as the EEG signals have non-linear nature, the experts have only about 50ND patients. That is why recent research has shown tremendous interest in graphs and Graph Neural Networks (GNNs) to generalize deep learning methods in non-linear and non-Euclidean data like EEG signal. On the other hand, graph interpretation is one of the main issues in GNNs. Thus, we develop an appropriate graph interpretation and feature extraction strategy from EEG signals before sending it to GNNs for signal classification. We construct visibility graphs on real world electroencephalogram dataset for signals classification and the effectiveness of our proposed method is validated on this dataset.

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Three-term conjugate gradient method for solving variational inequality problems over the fixed point set of nonexpansive mapping

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Abstract

In this study, we propose an iterative scheme via Three-term Conjugate Gradient Method for solving variational inequality problems which converges strongly to the solution of the given problem over the fixed point set of a nonexpansive mapping. The convergence was established and the numerical results indicate the effectiveness and robustness of the proposed method over the existing methods.

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Finite-time passivity analysis of neutral-type neural networks with mixed time-varying delays

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Abstract

This work focuses on the problem of finite-time passivity analysis of neutraltype neural networks with mixed time-varying delays. The time-varying delays are distributed, discrete and neutral in that the upper bounds for the delays are available. We are investigating the creation of sufficient conditions for finite boundness, finite-time stability and finite-time passivity, which has never been performed before. First, we create a new LyapunovKrasovskii functional, PengParks integral inequality, descriptor model transformation and zero equation use, and then we use Wirtingers integral inequality technique. New finite-time stability necessary conditions are constructed in terms of linear matrix inequalities in order to guarantee finite-time stability for the system. Finally, numerical examples are presented to demonstrate the results effectiveness. Moreover, our proposed criteria are less conservative than prior studies in terms of larger timedelay bounds.

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On the existence of fixed points of quasi-nonexpansive multimaps in a CAT(0) space

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Abstract

In this manuscript, we establish strong and weak convergence theorems for fixed points of multivalued quasi-nonexpansive mappings in the setting of CAT(0) space. Our results extend and unify some of the related results in the literature.

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A novel criteria on exponentially passive analysis for Takagi-Sugeno fuzzy of neutral dynamic system with various time-varying delays

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Abstract

This study is relevant to designing reliable exponentially passive analysis for T-S fuzzy of dynamic systems with various time-varying delays such as neutral, discrete, and distributed time-varying delays. By using the Lyapunov-Krasovskii function, The NewtonâASLeibniz theory, the zero equations, and the matrix inequality technique. The multiple delay-dependent criterion with assure exponentially passive on the discussed T-S fuzzy system, are defined in respect of linear matrix inequalities (LMIs) that can be checked easily using LMI toolbox of MATLAB. A less conservative exponentially passive criterion given for special cases of general stability of a neutral differential system, by those approaches. The results of this study are delay-dependent, which depend on the lower bound and the upper bound with the time-varying delay. Lastly, the examples of Numerical are presented the performance of our criteria with the results obtained summarize some of the previous results as well.

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Some discussion on generalizations of metric spaces in fixed point perspective

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Abstract

The motive of this paper is to provide an understanding on the role of generalizations of metric spaces in fixed point perspective. For this purpose the concept of pseudo non-triangular metric space is introduced which become a minimal required metric structure to establish new fixed point theorem for contractive type mappings.

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New stability criterion for linear system with mixed time-varying delays and nonlinear perturbations

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Abstract

This work investigates delay-dependent stability criterion for linear system with mixed time-varying delays and nonlinear perturbations. The less conservative stability criteria are obtained for the systems by constructing new augmented Lyapunov-Krasovskii functional, Leibniz-Newton formula, descriptor model transformation and various inequalities, which are presented in terms of linear matrix inequalities. Finally a numerical examples have been given to show the effectiveness of the proposed results.

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Accelerated Mann-type iterative algorithm for solving image restoration problems

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Abstract

In this paper, an accelerated Mann-type iterative algorithm generated by some inertial terms and three update vectors is introduced and studied for solving a fixed point problem of a nonexpansive mapping in Hilbert spaces. Under some usable properties of the considered mappings together with some nice properties on Hilbert spaces and the suitable conditions on scalar controls, these yield us to get a strong convergence result of an accelerated Mann-type iterative algorithm for finding a fixed point of a nonexpansive mapping which is associated to a zero point problem of some monotone mappings. Moreover, in order to demonstrate the benefits and applications of this new knowledge, we use an accelerated Mann-type iterative algorithm to solve image restoration problems. Finally, numerical results in different cases are shown in order to show the efficiency of the new algorithm, it was found that the new algorithm illustrates through numerical results that it has better performance in many ways than the previous existing results.

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Conditions for perturbations to define the resolvent of the equilibrium problem on geodesic spaces

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Abstract

Equilibrium problem [1] on a geodesic space X is defined as to find $z \in K$ such that $f(z, y) \geq 0$ for all $y \in K$, where $f\colon K \times K \to \mathbb{R}$ and K is a closed convex subset of X. Equilibrium problems have been studied as it relates to several problems such as fixed point problems, convex minimization problems, Nash equilibria, and so on.

Recently, in 2018, Kimura and Kishi [2] proposed a resolvent operator of equilibrium problems defined by a solution of an equilibrium problem on CAT(0) spaces. A CAT(0) space (X, d) is one of the geodesic spaces which have generally nonlinear structure, and the class of CAT(0) spaces contains Hilbert spaces. Its resolvent is used a square of the metric d^2 as a perturbation function. In 2021, Kimura [3] showed that a resolvent of an equilibrium problem can be defined using $-\log\cos d$ as the perturbation function on CAT(1) spaces.

In this talk, we consider sufficient conditions for perturbation functions to define the resolvent of an equilibrium problem on CAT(κ) space.

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A new iterative methods for a finite family of the split generalized equilibrium problem and fixed point problem

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Abstract

In this paper, we introduce a new iterative method for finding a common element of the set of solutions of a finite family of split generalized equilibrium problems, finite variational inequality problems and the set of common fixed points of a countable family of nonexpansive mapping in Hilbert spaces. Under appropriate conditions imposed on the parameters, the strong convergence theorems is obtained.

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Heat transfer analysis of radiator using different shaped nanoparticles water-based ternary hybrid nanofluids with applications: a fractional model

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Abstract

The suspension of nanoparticles in the conventional base fluids getting more attention of the scholars and researchers due to its unique thermal performance in different field of engineering sciences. Nanofluid performed well and showed satisfactory results in the heat transport phenomena which attracted the scientists to suspend different combinations of nanoparticles which named as "hybrid nanofluid". From the experimental investigations it is found that the rate of heat transfer is higher for hybrid nanofluid as compared to unitary nanofluid. Based on the above motivation the present study is focused to consider water-based ternary hybrid nanofluid with three different shaped nanoparticles i.e, spherical shaped aluminum oxide(Al_2O_3), cylindrical carbon nanotubes(CNT), and platelet shaped(Graphene) for the advance cooling process of radiator. From the present analysis it is found that this advance water-based ternary hybrid nanofluid showed promising enhancement in the heat transfer rate as compared to hybrid and unitary nanofluid. The present problem is formulated in the form of momentum and energy equations in terms of partial differential equations along with physical initial and boundary conditions. Furthermore, we have considered water-based ternary hybrid nanofluid with different shaped nanoparticles in channel. For the exact solutions the Laplace and Fourier transforms are applied. The influence of all the flow parameters is highlighted using the computational software MATHCAD. Using water-based ternary hybrid nanofluid enhances the rate of heat transfer up-to 33.67% which shows a promising thermal performance in the heat transfer rate. Furthermore, we have used nanoparticles in different ratios and found some interesting results which can be applied in different engineering problems specially, in cooling process.

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Heat transfer analysis of the mixed convective flow of magnetohydrodynamic hybrid nanofluid past a stretching sheet with velocity and thermal slip conditions

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Abstract

The present study is related to the analytical investigation of the magnetohydrodynamic flow of water hybrid nanoliquid with slip conditions via an extending surface. The thermal radiation and Joule heating effects are incorporated within the existing hybrid nanofluid model. The system of higher-order partial differential equations is converted to the nonlinear system of ordinary differential equations by interpreting the similarity transformations. With the implementation of a strong analytical method called HAM, the solution of resulting higher-order ordinary differential equations is obtained. The results of the skin friction coefficient, Nusselt number, velocity profile, and temperature profile of the hybrid nanofluid for varying different flow parameters are attained in the form of graphs and tables. Some important outcomes showed that the Nusselt number and skin friction are increased with the enhancement in Eckert number, stretching parameter, heat generation parameter, and radiation parameter for both slip and no-slip conditions. The thermal profile of the hybrid nanofluid is higher for the suction effect but lower for the Eckert number, stretching parameter, magnetic field, heat generation, and radiation parameter. For both slip and no-slip conditions, the hybrid nanofluid velocity shows an upward trend for both the stretching and mixed convection parameters.

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Levitin-Polyak well-posedness for generalized $(\eta, g, \varphi)-$mixed vector variational-type inequality problem

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Abstract

We introduce and analyze the notion of Levitin-Polyak (LP) well-posedness for generalized $(\eta, g, \varphi)-$mixed vector variational-type inequality problem. We establish some sufficient conditions for verifying these LP well-posedness and generalized LP well-posedness properties. Moreover, we give example to explain the determined assumptions.

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New exponential passivity analysis of neutral-type neural networks with distributed time-varying delays

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Abstract

The problem of exponential passivity analysis for neutral-type neural networks with distributed time-varying delays is studied. The discrete, neutral and distributed time-varying delays that the upper bounds for the delays are available. By constructing novel augments Lyapunov-Krasovskii functional and various inequalities, new delay-dependent criteria are established to ensure the exponential passivity of the neutral-type neural networks with mixed time-varying delays. The exponential passivity criteria are presented in terms of linear matrix inequalities (LMIs). Finally, numerical examples are shown to demonstrate the benefts and eectiveness of the derived theoretical results. The method given in this paper is less conservative and more general than the others.

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New guaranteed cost control for exponential stability of nonlinear system with mixed time-varying delays via feedback control

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Abstract

This paper presents a new guaranteed cost control for exponential stability of nonlinear system with mixed time-delays in state and feedback control. The mixed time-delays are considered both the discrete and the distributed time-varying delays, but not necessary to be differentiable. The proposed conditions allow us to design the state feedback controllers which stabilize the closed-loop system. By constructing an appropriate Lyapunov-Krasovskii functional, new delay-dependent sufficient conditions for the existence of guaranteed cost control are given in terms of linear matrix inequalities (LMIs). Moreover, we design new quadratic cost functions and minimize upper bound of them. Finally, numerical examples are given to illustrate the effectiveness and improve over some existing results in the literature.

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Convergence theorems for monotone nonexpansive mappings in ordered uniformly convex Banach spaces

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Abstract

In this talk, we prove nonlinear ergodic theorems for a family of monotone nonexpansive mappings in ordered uniformly convex Banach spaces. We also weak and strong convergence theorems for the mappings.

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A hybrid Hestenes-Stiefel and Dai-Yuan minimization with application in three degrees of freedom real-time motion control robotic model

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Abstract

This article presents a hybrid Conjugate Gradient (CG) minimization algorithm from optimal choice of the modulating non-negative parameter of Dai-Liao conjugacy condition. The new hybrid parameter is selected in such away that a convex combination of Hestenes-Stiefel and Dai-Yuan algorithms is fulfilled. The numerical computation adopts inexact line search which shows that the algorithm is robust and efficient compared with some known algorithms in literature equally the method is applicable to solve real life three degree of freedom motion control robotic model. The theoretical analysis shows the that the hybrid method proposed converges globally.

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Properties of enriched nonexpansive mappings in Hadamard spaces

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Abstract

In this work, we study some important properties of enriched nonexpansive mappings in the framework of Hadamard spaces and propose a viscosity-type algorithm for approximating fixed points of such mappings. Under appropriate assumptions, we obtain strong convergence of the sequences generated therefrom. As an application of our results, we establish the existence of solution of the variational inequality problem involving the mapping. Finally, we deduce an iterative scheme that converges strongly to a solution of the variational inequality problem.

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Numerical analysis of fractal fractional non-linear electro osmotic flow with cadmium telluride nanoparticles

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Abstract

Numerical simulations of non-linear Casson nanofluid flow were carried out in a microchannel using the fractal-fractional flow model. The nano-liquid is prepared by dispersing Cadmium Telluride nanoparticles in regular engine oil. Using relative constitutive equations, the system of mathematical governing equations has been formulated along with initial and boundary conditions. Dimensionless variables have been used to obtain non-dimensional form of the governing equations. Using Caputo-Fabrizio fractal-fractional operator, the dimensionless ordinary mathematical model was transformed into a fractal-fractional model. As the exact solution of non-linear fractal-fractional model is very tough to find therefore, the generalized formulated model has been solved numerically via Crank-Nicolson scheme. Various plots are generated in relation to the inserted parameters. From the analysis it has been observed that greater magnitude of electro-kinetic parameter slows down the fluid's velocity. It is also worth noting that the fractional and classical model can also been deduced from the fractal-fractional model by taking the parameters $\alpha \to 0$, and $\alpha, \beta \to 0$ respectively.

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A Relation between Hilbert's 13th problem and data compression problem

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Abstract

In 1957, Kolmogorov and Arnold solved negatively Hilbert's 13th problem asking if all continuous functions of several real variables can be represented as appropriate superpositions constructed from several continuous functions of fewer real variables.

In this talk, we discuss a relation of their solution to Hilbert's 13th problem and the data scientific problem asking if all higher dimensional numerical tables can be represented as appropriate superpositions constructed from several lower dimensional numerical ones.

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Improved extended dissipativity results for T-S fuzzy neural networks with interval time-varying delay

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Abstract

The asymptotic stability and extended dissipativity performance of T-S fuzzy neural networks (NNs) with interval time-varying delay are investigated in this work. To obtain the improved results, we construct the Lyapunov-Krasovskii functional (LKF), which consists of single, double, triple, and quadruple integral terms containing full information of the delays and a state variable. Moreover, an improved Wirtinger inequality, a new triple integral inequality, and zero equation, along with a convex combination approach, are used to deal with the derivative of the LKF. By using Matlab's LMI toolbox and the above methods, the new asymptotic stability and extended dissipativity conditions are gained in the form of linear matrix inequalities (LMIs), which include passivity, $\mathrm{L}_2 - \mathrm{L}_\infty$, H_∞, and dissipativity performance. Finally, numerical examples that are less conservative than previous results are presented. Furthermore, we give numerical examples to demonstrate the correctness and efficacy of the proposed method for asymptotic stability and extended dissipativity performance of the T-S fuzzy NNs.

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Quasi-nonexpansive selections and convergence theorems for multivalued nonexpansive mappings in Banach spaces

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Abstract

In this talk, we investigate selections of multivalued mappings and prove that a multivalued nonexpansive mapping with endpoint property in a Banach space has a quasi-nonexpansive selection. We apply our results to prove weak convergence theorems of two multivalued nonexpansive mappings in uniformly convex Banach spaces.

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Sadovski-Darbo fixed point theorem for ψ-Riemann-Liouville fractional differential equation with Riemann-Stielties integral conditions

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Abstract

In this paper, we study and consider the existence, uniqueness and stability solution of ψ- Riemann-Liouville Fractional Differential Equation with Riemann-Stielties integral Conditions. Via fixed point theorem of Sadovski-Darbo and using Boyd-Wong find uniqueness solution, apart from this we find condition of generalized Ulam-Hyers stability. An example is included to illustrate the applicability of our results.

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Modified inertial algorithms for inclusion problems

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Abstract

We introduce some new inertial algorithms for finding the common solution of an inclusion problem and a fixed point problem of a nonexpansive mapping in real Hilbert space. We prove some weak and strong convergence theorems of the modified inertial forward-backward algorithms and give some numerical examples and comparison of other related works to show advantages and applicability of our algorithms.

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Laplacian twin support vector machine with Pinball loss for semi-supervised classification

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Abstract

Semi-supervised learning utilizes labeled data and the geometric information in the unlabeled data embedded in the marginal distribution to construct a model whereas supervised learning makes use of the only labeled data. So, semisupervised learning establishes a more reasonable classifier. In recent years, the Laplacian support vector machine (Lap-SVM) for semi-supervised classification has received a lot of interest. To develop the performance of Lap-SVM, Laplacian twin support vector machine (Lap-TSVM) for semi-supervised classification has shown exceptional performance as an addition to improve the computational complexity. However, dealing with noise sensitivity and instability for resampling is still a challenge. In this paper, we provide a Laplacian twin support vector machine with the pinball loss function (Lap-PTSVM) for semi-supervised classification to effectively handle the aforementioned problems. As a result, it improves a better generalization ability of the classifier. Several experiments have been performed on artificial and UCI datasets. Linear and nonlinear situations are discussed. Also, the results show that our proposed Lap-PTSVM has noise insensitivity comparable to the Lap-TSVM and has a great generalization performance.

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Iterative schemes converging to a fixed point of a mapping on a complete geodesic space

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Abstract

The study of a nonexpansive mapping defined on a metric space has been considered by many researchers in the setting of Hilbert and Banach spaces. In 2004, Kirk [2] proved a fixed point theorem for Hadamard spaces, defined as a complete CAT(0) space. Since then, various kinds of existence and approximation results for mappings on such spaces have been proposed. This work mainly focuses on approximation methods to a fixed point of a mapping defined on a complete geodesic space. The Halpern iterative scheme is a crucial method converging to a solution to our problem. In this scheme, we use a convex combination with an anchor point to generate an iterative sequence. The Mann iterative scheme is another method, and it is also generated by using a convex combination, but it does not use an anchor point. For convergence results for these schemes on Hadamard spaces, see [3,1]. In this work, we consider yet another type of approximation method called a projection method. We compare these different types of approximation methods and obtain several new convergence results with recent developments.

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