
# Proceedings

# The 6th International Arab Conference on Mathematics and Computations

**24-26 April 2019, Zarqa University, Jordan**

Editors

Aliaa Burqan, Shawkat Alkhazaleh and Ahmad Qazza

صندوق دعم البحث العلمي
Scientific Research Support Fund

# Proceedings

# The 6th International Arab Conference on Mathematics and Computations (IACMC 2019)

24-26 April 2019

Zarqa University

Editors

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Organized by the Faculty of Science, Zarqa University

Sponsored by
Zarqa University and Scientific Research and Support Fund

# FOREWORD

**Aliaa Burqan**
**Conference Chairman**
**Zarqa University**

I am happy to introduce to you the 6th International Arab Conference on Mathematics and Computations, IACMC 2019. This conference is among a series of international conferences held and sponsored by Zarqa University. The purpose of all IACMC's is to bring together researchers and professionals in all fields of Mathematical Sciences to meet, discuss, to share and explore ideas that improve their research. On the other hand, these conferences will also provide a good opportunity to encourage young researchers, students and all those who are desirous of working in the field of Mathematics to interact with each other and to explore possibilities for future collaborative works.

This book contains the abstracts of IACMC 2019 which is held in Zarqa University on April 24-26, 2019. This sixth edition contains a large number of research topics and applications in both pure and applied mathematics in addition to the field of statistics which are the topics included in the scope of IACMC's. Furthermore, the program is enriched by several keynote lectures delivered by well-known experts in their areas of Mathematics.

IACMC 2019 received 120 abstract submissions from 20 countries. The accepted full-papers went through an evaluation method: each paper was reviewed by two reviewers from the IACMC Scientific Committee; one of them is an international known expert. All accepted papers will be published in the proceedings of IACMC 2019. Authors of some selected papers, based on the reviewers evaluations and on the oral presentations, will be invited to submit extended versions of their papers for a book which will be published by Springer.

The program for this conference required the dedicated effort of many people. Firstly, we must thank the sponsors of IACMC 2019: Zarqa University and The Scientific Research Support Fund. Secondly, we thank the invited speakers for their invaluable contributions and the authors, whose research efforts are herewith recorded. We also give our thanks to the reviewers for their diligent and professional reviewing. Last but not least, a special word of thanks is due to those who spent much of their time to make the success of this conference: to all members of the Local and Organizing Committees for their superb job.

We look forward to welcoming and sharing this conference with you. Wishing you all an exciting conference and an unforgettable stay in Jordan and hoping to meet you again for the 7th IACMC.

# CONFERENCE ORGANIZATIONS

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## KEYNOTE SPEAKERs

**Shaher Momani**
**Professor of Mathematics**
**Jordan University**

Prof. Shaher Momani is an ISI Highly Cited Researcher and a recipient of The Order of King Abdullah II Ibn Al Hussein for Excellence of the Second Class for his Academic Contributions in Scientific Research. Prof. Shaher Momani received his B.Sc. in Mathematics from Yarmouk University in 1984, and his Ph.D. from the University of Wales (UK) in 1991.

Prof. Momani is the first and only distinguished research Professor at The University of Jordan since its inception in 1962. He has been at the forefront of research in the field of Fractional Calculus in two decades and is classified as one of the top ten Scientists in the World in this field for the period 2009-2013 according to Thomson Reuters (Web of Knowledge).

Prof. Momani has been selected by Clarivate Analytics in its prestigious list of Highly Cited Researchers in Mathematics: 2014, 2015, 2016, and 2017. And in 2018, he have been selected by Clarivate Analytics in Cross-Field category to identify researchers with substantial influence across several fields during the last decade. Also, he has been selected by Clarivate Analytics in its prestigious list of The World's Most Influential Scientific Minds since 2014

**Fuad A. Kittaneh**

**Professor of Mathematics**

**Jordan University**

Prof. Fuad A. Kittaneh earned his B.Sc. in Mathematics from the University of Jordan (UJ) in 1976, his M.Sc. in Mathematics from King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, in 1978, and his Ph.D. in Mathematics from Indiana University, Bloomington, Indiana, U.S.A., in 1982.

Prof. Kittaneh began his academic career as Research Assistant at King Fahd University of Petroleum and Minerals (1976-1977), and became an Instructor soon after (1977-1978). He also served as Associate Instructor at Indiana University (1978-1982), Assistant Professor at United Arab Emirates University (1982-1987), Assistant Professor at Kuwait University (1987-1989), and Associate Professor at Kuwait University (1989-1990). In addition, he was a Visiting Scholar at Indiana University (1990-1991). He joined UJ as Associate Professor in 1991, where he was promoted to the rank of Professor in 1994. He also taught at a number of private universities in Jordan, including Petra University (1998-1999), Al-Zaytoonah University (2005-2006), and Al-Ahliyya Amman University (2013-2014). Dr. Kittaneh is currently the Dean of the Faculty of Science at the University of Jordan, and he has held different administrative positions at UJ, including Chairman of the Mathematics Department (2000-2005), Dean of Academic Research (2009-2010), Acting Vice President for Scientific Research, Graduate Studies, and Quality (September - October 2010), Dean of the Faculty of Science (2011-2012), and President of Hamdi Mango Center for Scientific Research at the University of Jordan (2008- 2012). He was also the Dean of Graduate Studies and Scientific Research at Al-Ahliyya Amman University (2013-2014). He is a member of many professional societies including the American Mathematical Society, and a reviewer for Mathematical Reviews and Zentralblatt MATH. He is also a referee for many leading mathematical journals of highest international reputation.

He Also has presented papers at numerous national and international conferences in 25 countries around the world including Jordan. He has been invited to give talks at several international leading universities and institutes, including Tohokou University, the University of Toronto, the Indian Statistical Institute, and the Institute of Mathematics of the Polish Academy of Sciences.

Prof. Kittaneh serves on the editorial boards of 20 international mathematical journals, most of which are indexed in Scopus or ISI, including Algebra, Banach Journal of Mathematical Analysis, Bulletin of Mathematical Analysis and Application, Filomat, ISRN Algebra, Journal of Inequalities and Applications, Journal of Inequalities in Pure and Applied Mathematics, Operators and Matrices, The Scientific World Journal, and Special Issues of Linear Algebra and its Applications in honor of Rajendra Bhatia and Roger Horn.

Prof. Kittaneh is the recipient of many national and international awards and honors. He was awarded Abdul Hameed Shoman Prize for Young Arab Scientists (1987), TWAS Associate Membership Scheme at Centers of Excellence in the South (1995), Ministry of Higher Education Prize for Distinguished Scientific Research (2003), Scopus Certificate Award (2009), the University of Jordan Prize for Distinguished Researcher (2012), Ali Mango Award for Distinguished Researcher (2014), and the Faculty of Science Award for Distinguished Researcher (2015).

He was also a member of the Selection Committee of the King Faisal International Prize in Science (November 2001 and December 2005), and a participant in the EU Marie Curie Program of Transfer of Knowledge at the Institute of Mathematics of the Polish Academy of Sciences (August-September 2008 and May-June 2009). He has supervised the theses of more than 70 M.Sc. and Ph.D. students. Dr. Kittaneh is a highly accomplished scholar with more than 140 research papers published in ISI mathematical journals of high quality. These papers are in the fields of Functional Analysis, Matrix Analysis, and Operator Theory. Some of these papers were written jointly with very famous mathematicians, such as Koenraad Audenaert, Rajendra Bhatia, Albrecht Bottcher, Jean-Christophe Bourin, Chandler Davis, Roger A. Horn, Hideki Kosaki, Ren-Cang Li, Josip Pecaric, and Takeaki Yamazaki.

**Maslina Darus**

**Professor of Mathematics**

**Universiti Kebangsaan Malaysia**

Maslina Darus obtained her first degree in 1992 from Acadia University, Nova Scotia and obtained her PhD from University of Wales, Swansea, U. K. in 1996. She is Full Professor since 2006. She hold position as Head of programme for 5 years (2004-2009), Chair of the School of Mathematical Sciences (2010-2013), Deputy Dean for Faculty of Science and Technology (2013-2018). She is also the President of the Malaysian Mathematical Sciences Society (PERSAMA) since 2013 to date. In 2018, she was conferred as the Fellow of the Academy Science of Malaysia (FASc). She has graduated more than 30 PhD students. She wrote more than 800 articles in refereed/indexed journals of various databases, be it in Scopus, ISI Thomson, MathSciNet and other traditional journals globally. Her main research interests is in univalent function theory and its properties.

**Samir Saker**

**Professor of Mathematics**

**Mansoura University**

Prof. Samir H. Saker was born in Egypt at 1971. He got his Ph. D. (December 2002) in Mathematics, from Adam Mickiewicz University, Poznan, Poland. He got IKY Postdoctoral Scholarship, Department of Mathematics, University of Ioannina, Greece (March 2004-August 2004), Fulbright Postdoctoral Scholarship, Department of Mathematics, Trinity University, San Antonio, Texas, USA (March 2005-August 2005), Postdoctoral-Fellowship, University of Calgary, Department of Mathematics, Canada, (February 2006-July 2006), Postdoctoral from TUBITAK, Turkey (24-July-22 August 2016).

In 2004, he won the prestigious Abdel Hamid Shoman Award for Young Arab Scientists in Mathematics. In 2005, he won National State Prize in Basic Science (Mathematical Science), Egyptian Academy of Scientific Research and Technology.

In 2009, he won Amin Lotfy Award in Basic Science (Mathematical Science), Egyptian Academy of Scientific Research and Technology. In 2014, he won again National State Prize in Basic Science (Mathematical Science), Egyptian Academy of Scientific Research and Technology.

In 2017 he got the privilege of the first class from the president of Arab Republic of Egypt His is an author and co-author of more than 200 papers published in international impacted journals and is the author and co-author of 5 books, three of them published by Springer at 2014, 2015, 2016. The last book is about Hardy type inequalities on time scales which is the first title appears in this subject.

## INVITED PLENARY SPEAKER

**Jochen Rau**
**Professor of Mathematics**
**The RheinMain University of Applied Sciences**
**Germany**

Jochen Rau received degrees in physics and mathematics from Goethe University Frankfurt (Germany), University of Cambridge (UK), and Duke University (USA), and did postdoctoral research at Max Planck Institutes in Heidelberg and Dresden, at the European Centre for Theoretical Studies in Nuclear Physics and Related Areas, as well as at Technical University of Darmstadt. He left academia to pursue a career in industry, and subsequently returned about a decade later. He is currently professor of mathematics at the RheinMain University of Applied Sciences. In addition, he has taught theoretical physics at Goethe University Frankfurt and at Ulm University, Germany.Professor Rau website can be found under this link

# Some results of regularity and explicit solution in a class of elliptic free boundary problems with Neumann boundary condition

Abderachid saadi
Mohamed Boudiaf university,
Department of Mathematics, Msila, Algeria.
Laboratoire d'Equations aux Derivees Partielles Non Lineaires
et Histoire des Mathmatiques
Ecole Normale Superieure 16050 Kouba, Algiers, Algeria.
E-mail: rachidsaadi81@gmail.com

## Abstract

We show the Lipschitz continuity of solution, for a class of two dimensional free boundary problems with Neuman boundary condition. We give also some results of the free boundary in a class of n dimensional free boundary problems, with Neuman boundary condition.

**Keywords**: Lipschitz continuity; free boundary; Neuman boundary condition.

# A new type of Kannan and Chatterjea fixed point theorems in b-metric spaces

Taieb Hamaizia
Department of Mathematics and Informatics, Faculty of Sciences, Larbi Ben M'hidi University,
Oum Elbouaghi, Algeria
E-mail: tayeb042000@yahoo.fr

## Abstract

In this paper, we define the notion of b-metric space, then we introduce a new class of principle contraction to prove Kannan and Catterjea fixed point theorems in b-metric spaces. We also give some examples to illustrate the given results.

**Keywords**: b-metric space; fixed point;Ccauchy sequence

# Comparing the efficiency of different startified sampling methods for estimating the population mean

Mahmoud I. Syam

Department of Mathematics, Foundation Program, Qatar University,

Doha, P.O. Box (2713), Qatar

E-mail: M.syam@qu.edu.qa

## Abstract

Many methods related to stratified ranked set sampling are suggested for estimating the population mean. Some of these methods are stratified quartile ranked set sample (SQRSS), stratified percentile ranked set sample (SPRSS), stratified median ranked set sample (SMRSS) and stratified extreme ranked set sample (SERSS). These estimators are compared to stratified simple random sample (SSRS) and stratified ranked set sample (SRSS). It is found that all estimators are unbiased estimators of the population mean and they are more efficient than their counterparts using SSRS and SRSS. A simulation study is considered to compare the efficiency of the above estimators.

**Keywords:** Ranked set sampling; Stratified; Quartile; Median; Percentile; Extreme; Efficiency.

# Integro-differential equation method for determination the shape of two dimensional jet flows in a semi-infinite tube

Abdelkader Amara* and Abdelkader Gasmi
Laboratory of Applied Mathematics, University of Ouargla, Algeria
E-mail: amara.abdelkaderdz@gmail.com*
Laboratory of Pure and Applied Mathematics, University of M'sila, Algeria
E-mail: gasm_a@yahoo.fr

## Abstract

In this work, we studied mathematically the two-dimensional free surface problem of a jet of inviscid and incompressible fluid into a semi-infinite tube. The flow is considered to be irrotational. Where we take in the consideration the surface tension effect, the problem becomes very difficult because of the nonlinear condition on the free surface of the flow domain. This problem is also known as free boundary problems whose his mathematical formulation involves surfaces that have to be found as part of the solution. By using the integro-differential equation method, we solved numerically this problem for different values of the Weber number, and some typical profiles of the free surface of the jet are illustrated.

**Keywords:** Integral equation ; Free-surface; Inviscid flow; Weber number

# Stability of solutions for semilinear fractional differential equation by using Lyapunov function

Brahim Tellab
Mathematics Department, Ouargla University, 30000 Ouargla Algeria
E-mail: brahimtel@yahoo.fr

## Abstract

In the present paper, several types of stability of the zero solution for a semilinear fractional-order system with exogenous input and Caputo fractional derivative have been studied using the Lyapunov function. In particular, conditional asymptotic stability and conditional Mittag- Leffler stability have been presented by introducing the Mittag-Leffler function of one and two parameters.

**Keywords:** Nonlinear fractional–order system; fractional calculus; conditional asymptotic stability; uniformly asymptotic stability; globally uniformly asymptotic stability.

# Numerical study of stagnation point flow over a sphere with go/ water and kerosene oil based micropolar Nano fluid

Hamzeh T. Alkasasbeh1*[1] and Mohammed Z. Swalmeh[2]
[1] Department of Mathematics, Faculty of Science, Ajloun National University, P.O. Box 43, Ajloun 26810, Jordan
[2] Faculty of Arts and Sciences, Aqaba University of Technology, Aqaba-Jordan
* Corresponding author: hamzahtahak@yahoo.com

## Abstract

In this article, the mixed convection boundary layer flow in micropolar nanofluids at the lower stagnation point of a solid sphere in a stream flowing vertically upwards has been studied numerically for both issues of a heated and cooled solid sphere with a constant surface heat flux. Grephene oxide nanoparticle suspended in two different types of fluids namely water and kerosene oil. The governing partial differential equations including continuity, momentum and energy have been reduced to ordinary differential equations ones and solved via an implicit finite-difference scheme known as the Keller-box method. Numerical solutions are taken out for temperature profiles, velocity profiles, angular velocity profiles, with different values of the parameters, namely, the nanoparticle volume fraction $\chi$ and the mixed convection parameter $\lambda$. it is found that GO water has higher in temperature compared with GO kerosene oil.

**Keywords:** Mixed Convection, stagnation point, Micropolar Nanofluid, Solid Sphere.

# On one inverse problem of transfer of substance in environment

Khuzhayorov Bakhtiyor[1] and Khaydarov Odil[*2]
[1]Samarkand State University: Republic of Uzbekistan
[2] Samarkand State University: Republic of Uzbekistan
odil3500@mail.ru

## Abstract

In the last years the increase of world population and industrialization the problem of pollution of groundwater, in addition to other forms of pollution such as air pollution, has become threatening. The present research deals with modelling of pollutant transport through saturated aquifers. Using this mathematical model it is possible to prognosticate the concentration distribution, spatial as well as temporal, in the aquifer depletion. The scientific paper also deals with the one of the methods of controlling the pollutant movement namely by pumping wells. A simulator model is developed to determine the number, location and rate of pumping of a number of pumping wells near the source of pollution so that the concentration is within the approved limits at the visual perception such as a model of calculation which gets its water supply from groundwater.

# Representation of positive integers as a sum of distinct Tribonacci numbers

S. Badidja, A. Boudaoud
Laboratory of Pure and Applied Mathematics (L.M.P.A.)
University of Mohamed BOUDIAF of M'sila, Faculty of Mathematics and Computer Sciences, M'sila, Algeria

## Abstract

Let$(u_m)_{m\geq 1}$be a sequence of elements of $N$ and let $N \geq 1$ be a given positive integer. The writing of $N$ following the form$N = \sum_{m=1}^{\infty} a_m u_m$ where the coefficients obey some requirements and constraints is well known in mathematics under the name "representation" (See for example ,[4],[8]).
In our work we consider the Tribunates's sequence$(Tm)m \geq 1$ and we show that every integer $N \geq 1$can be written in a unique way following the form $N = \sum_{m=1}^{\infty} a_m T_m$, where $a_m (m \geq 1)$ is the binary digit zero or one; this representation is unique if the coefficients $a_m (m \geq 1)$ satisfy the condition$\begin{cases} a_m a_{m+1} = 0 \\ a_m a_{m+2} = 0 \end{cases} for\ m \geq 1$. In addition, we give some other results related to the question treated.

# For solution of particle momentum elasticity theory system Somilian - Betty formula, Carmelian matrix and integral formula

Homidov Farhod
Department of Higher mathematics, Bukhara Technological Institute of Engineering,
Uzbekistan, Bukhara
farxod2708@mail.ru

## Abstract

This section focuses primarily on the construction of the Somilian-Betti formula and the fundamental solution of the Moment Elasticity Theory system. This integral formulas allows the solution of the value of the solution in the field according to the values of a part of the field boundary. These integral formulas are commonly known as the Grin functions known from the common course and the Grin formulas. Inthissection, iswritteninaclearview.
$x = (x_1, x_2)$ and$y = (y_1, y_2)$ points $E^2$-obtained from the two dimensional euclidean domain, and the $D$ elastic medium with $E^2$ loose-smooth $\partial D$ line field, $S - \partial D$The smooth part of the $D$ system of homogeneous moment momentary elasticity theory in the field

$$\begin{cases} (\mu + \alpha)\Delta u + (\lambda + \mu - \alpha) graddiv\, u + 2\alpha\, rotw + \rho\theta^2 u = 0, \\ (v + \beta)\Delta w + (\varepsilon + v - \beta) graddiv\, w + 2\alpha\, rotu - 4\alpha\, w + j\theta^2 w = 0 \end{cases} \quad (1)$$

be given. Right here $U(x) = \big(u_1(x), u_2(x), w_1(x), w_2(x)\big) = (u(x), w(x))$ the solution of the system, $\Delta$- Laplace Operator,$\lambda, \mu, v, \beta, \varepsilon, \alpha$ elastic environment, satisfying the following condition $\mu > 0, 3 + 2\mu > 0, \alpha > 0, \varepsilon > 0, 3\varepsilon + 2v > 0, \beta > 0, j > 0, \rho > 0, \theta \in R^1$.

# Dynamical proprieties of solutions in a 3-d Lozi map

Mohammed Mammeri[1] and Nour Elhouda Kina[2]
Department of Mathematics, University of Kasdi Merbah, Ouargla, Algeria
E-mail: mammeri_muh@yahoo.fr and mammeri.mohammed@univ-ouargla.dz

## Abstract

In this letter, the existence of some properties of solutions in 3-D Lozi map is presented, that the results have been confirmed by simple rigorous mathematical analysis method.

**Keywords:** 3-D Lozi map, Unbounded orbits, Global attractors, solutions of the 3-D Lozi map

# On modification of an adaptive stochastic mirror descent algorithm for convex optimization problems with functional constraints

Mohammad S. Alkousa
Department of Control and Applied Mathematics, Moscow Institute of Physics and Technology (National Research University), 9 Institutskiy per., Dolgoprudny, Moscow Region, 141700, Russia.
mohammad.alkousa@phystech.edu

## Abstract

The paper is devoted to a new modification of recently proposed adaptive stochastic mirror descent algorithm for convex optimization problems in the case of several convex functional constraints. Algorithms, standard and its proposed modification, are considered for the type of problems with nonsmooth Lipschitz-continuous objective function. Both algorithms, with accuracy $\varepsilon$ of the approximate solution to the problem, are optimal and have the complexity $O(\varepsilon^{-2})$. In both algorithms, the precise first-order information, which connected with (sub) gradient of the objective function and functional constraints, is replaced with its unbiased stochastic estimates. This means that in each iteration, we can still use the value of the objective function and functional constraints, but instead of their (sub) gradient, we calculate their stochastic (sub) gradient. Due to the consideration of not all functional constraints on non-productive steps, the proposed modification allows saving the running time of the algorithm. Estimates for the rate of convergence of the proposed modified algorithm is obtained. The results of numerical experiments demonstrating the advantages and the effectiveness of the proposed modification for some examples are also given.

**Keywords:** Lipschitz-continuous function, nonsmooth constrained optimization, adaptive stochastic mirror descent, stochastic (sub) gradient.

# Ricci Inheritance Collineation of Plane Symmetric Static Spacetimes

Suhail Khan[1] and Ahmad T Ali[2;3]
[1] Department of Mathematics, University of Peshawar, Peshawar,
Khyber Pakhtookhwa, Pakistan.
[2] King Abdulaziz University, Faculty of Science, Department of Mathematics,
PO Box 80203, Jeddah, 21589, Saudi Arabia.
[3] Mathematics Department, Faculty of Science, Al-Azhar University,
Nasr City, 11884, Cairo, Egypt.
E-mail: suhail_74pk@yahoo.com

## Abstract

The Ricci Inheritance Collineations (RICs) for the plane-symmetric static space-time are explored. The non-linear coupled RIC equations are solved to get the general form of Ricci Inheritance symmetries. Non-Degenerate Ricci tensor of plane symmetric static space-time exhibit finite dimensional Lie algebra of RICs. Also, it comes out that for degenerate Ricci tensor of space-time under consideration, an infinite dimensional Lie algebra is obtained with certain exceptional cases where a .finite dimensional RICs are obtained. In four cases, metrics are also obtained which actually admit the obtained RICs for degenerate Ricci tensor. Among these four metrics, the Petrov type of the Weyl tensor for the three spacetime metrics is type O and only one metric has weyl tensor of Petrov type II. In total 31 difierent cases are obtained and listed in this paper where the spacetime metric admit either finite or infinite dimensional Lie algebra.

**Keywords:** Symmetries of a spacetimes, Conformal Ricci Inheritance Collineation, Plane Symmetric Static Spacetimes.

# A sign pattern that admits sign regular matrices of order two

Rola Alseidi
Department of Mathematics and Statistics, University of Konstanz, 78464, Germany
rola-ali-nazmi.alseidi@uni-konstanz.de

## Abstract

In this paper, conditions are identified under which a sign pattern corresponding to undirected cycles admits matrices which are sign regular of order two.

**Keywords:** Strictly sign regular of order k; sign regular of order k; sign pattern; closure property; interval property

# On dimant p-summing multilinear operators

A. Bougoutaia[1] and A. Belacel[2]
[1]Laboratory of Pure and Applied Mathematics, University of Laghouat, Algeria
E-mail: amarbou28@gmail.com
[2]Laboratory of Pure and Applied Mathematics, University of Laghouat, Algeria
E-mail:amarbelacel@yahoo.fr

## Abstract

In this talk we introduce and study new class between two Banach lattices spaces and extend the notion introduced by Dimant in the positive framework, and prove the domination theorem for this new class of operators.

# On strongly p-summing and p-convex multilinear operators

A. Belacel[1] and A. Bougoutaia[2]
[1]Laboratory of Pure and Applied Mathematics, University of Laghouat, Algeria
E-mail:amarbelacel@yahoo.fr
[2]Laboratory of Pure and Applied Mathematics, University of Laghouat, Algeria
E-mail: amarbou28@gmail.com

## Abstract

The gaol of this talk is to give and study the notion of Cohen positive $p$ −summing multilinear operators. We prove a natural analog of the Pietsch domination theorem for these classes and characterize their conjugates.

# Quasi-Hadamard product of certain subclasses of $\beta$ −spirallike functions of order $\alpha$

**Tariq Al-Hawary**[1], Feras Yousef[2] And B.A. Frasin[3]
[1]Department of Applied Science, Ajloun College, Al-Balqa Applied University, Ajloun 26816. Jordan,
E-mail address: tariq_amh@yahoo.com
[2]Department of Mathematics, University of Jordan, Amman 11942. Jordan.,
E-mail address: FYousef@ju.edu.jo
[3]Faculty of Science, Department of Mathematics, Al al-Bayt University, P.O. Box: 130095 Mafraq, Jordan
E-mail address: bafrasin@yahoo.com

## Abstract

In this paper, we obtain certain results concerning the quasi-Hadamard product of certain subclasses of $\beta$ -spirallike functions of order $\alpha$.

# Mathematical model of pipeline oscillations on a viscoelastic base transporting a two-phase fluid

B.A. Khudayarov* and Kh.M.Komilova
Department of Higher Mathematics, Tashkent institute of irrigation and agricultural mechanization engineers, Tashkent, Uzbekistan. E-mail*: bakht-flpo@yandex.ru

## Abstract

Results of studies of the oscillations of pipelines conveying a two-phase slug flow are presented in the paper. A viscoelastic model of the theory of beams and the Winkler base model are used in the study of pipeline oscillations with a gas-containing slug flowing inside. The Boltzmann-Volterra hereditary theory of the viscoelasticity is used to describe the viscoelastic properties of the pipeline material and earth bases. The effect of gas and liquid phases flow rates, influence of tensile forces in the longitudinal direction of the pipeline, parameters of Winkler bases, parameters of singularity in the heredity kernels and geometric parameters of the pipeline on the oscillations of structures with viscoelastic properties are numerically studied. It is revealed that an increase in the length of the gas bubble zone leads to a decrease in the amplitude and oscillation frequency of the pipeline. The critical rates for a two-phase slug flow are determined. It is revealed that an increase in the soil density of the bases leads to an increase in the critical rate of gas flow. It is shown that an account of viscoelastic properties of structure material and earth bases leads to a decrease in the critical flow rate.

**Keywords:** mathematical model, two-phase slug flow, critical rate of a two-phase slug flow.

# Numerical simulation of vibrations of pipe elements with a fluid flow

B.A. Khudayarov and F.Zh. Turaev*
Department of Higher Mathematics, Tashkent institute of irrigation and agricultural mechanization engineers, Tashkent, Uzbekistan.

E-mail*: t.fozil86@mail.ru

## Abstract

The article presents the results of a study of vibration process in pipelines conveying fluid or gas. In this study, a mathematical model pipeline was used in the form of cylindrical shell and a viscoelastic foundation in the form of two-parameter model of the Pasternak. The hereditary Boltzmann-Volterra theory of viscoelasticity is used to describe viscoelastic properties. The effects of the parameters of the Pasternak foundations, the singularity in the heredity kernels and geometric parameters of the pipeline on vibrations of structures with viscoelastic properties are numerically investigated. It is found that an account of viscoelastic properties of the pipeline material leads to a decrease in the amplitude and frequency of vibrations by 20-40%. It is shown that an account of viscoelastic properties of soil foundations leads to a damping of vibration process in pipeline.

**Keywords:** pipeline, mathematical model, numerical algorithm, cylindrical shell

# Complex Fuzzy Parameterized Soft Set

Anas Aljarah[1]*, Abd Ulazeez M.J.S. Alkouri[2], Abdul Razak Salleh[3], and Mourad Oqla Masadeh[4]

[1, 3] school of mathematical sciences, Faculty of science and technology, University Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia.

[2]Mathematics department, Ajloun National University, ,P.O. 43-Ajloun- 26810 Jordan.

[4]Applied science department, Al-Balqa Applied University, Ajloun, Jord*an*

## Abstract

In this paper, we first introduce complex fuzzy parameterized soft set (CFPSS) and its related properties. We then give basic operations on CFPSS namely complement, union and intersection. Some properties of the operations are derived. Also, we introduce two more operations on CFPSS, which help us to demonstrate an example on our concept of CFPSS. We give an example which shows that the method can be successfully applied to the problems that contain uncertainties.

**Keywords:** Fuzzy soft sets, fuzzy parameterised soft sets, complex fuzzy parameterised soft set, CFPSS.

# Cramer-Rao bound of direction finding using multi-concentric circular arrays

Dominic Makaa Kitavi and Musyoka Kinyili
Department of Mathematics, Computing, and Information Technology
School of Pure and Applied Sciences, University of Embu, Kenya
E-mail address: kitavi.dominic@embuni.ac.ke

## Abstract

Consider concentric circular arrays consisting of identical isotropic sensors. Concentric circular arrays preserve circular symmetry of the simple circular arrays, while increasing the number of spatial samples per each time instant. Direction of arrival (DOA) estimation is a key area of sensor array processing which is encountered in a broad range of important engineering applications. These applications include wireless communication, radar, sonar, among others. This paper investigates direction-finding estimation accuracy through Cramer-Rao bound derivation and analysis. It was observed that even with the same number of sensors, distributing them in a number of concentric circular arrays improves estimation accuracy.

**Keywords:** array signal processing, direction of arrival estimation, direction finding, Cramer-Rao bound

# On Chebychev-Type Inequalities and Decision Analysis Problems

T.A.Rather and N.A.Rather
Department of Mathematics
University of Kashmir
Srinagar, 190006,
India.
tariqrather@redi_mail.com

## Abstract

In this paper, we present refinements of some probability inequalities. We begin with a brief introduction and mention the well-known Chebyshev's inequality which describes the fundamental relationship between mean and variance of a random variable. Here we first present a more general theorem which besides yielding several interesting results, includes Chebyshev's inequality as a special case. Our next result also includes Chebyshev's inequality as a special case when $\lambda = 0$.

Besides, we use these results to prove a generalization as well as a refinement of Chebyshev's inequality. By suitable choice of moment and objective functions, we shall formulate and solve many practical decision analysis problems. We shall also try to describe the new general framework and theoretical results, discuss computational strategies and try to find specific results in dynamic programming, decision analysis with incomplete information, Bayesian statistics and option pricing.

**Key words:** Probability Inequalities: Generalized Chebyshev's inequalities, applications in probability and decision analysis.

# A new hybrid conjugate gradient coefficient for large scale nonlinear unconstrained optimization under exact line search

Talat Alkhouli[1,2], Hatem Abu-Hamatta1[1], Mustafa Mamat[2], Mohd Rivaie[3]
[1]Applied ScienceDepartment ,Aqaba University College,
Balqa Applied University, Jordan
E-mail: [Talat.khouli, Hatem]@bau.edu.jo
[2]Department of Computer Science and Mathematics, Faculty of Informatics and Computing,
University Sultan Zainal Abidin, 21030 Terengganu, Malaysia
E-mail: Talat.khouli@bau.edu.jo
[3]Department of Computer Science and Mathematics, Univesiti Technology MARA (UITM),
23000 Terengganu, Malaysia

## Abstract

The conjugate gradient method is an important and efficient method to solve the unconstrained optimization problems, especially for large scale problems. Its wide application in many fields is due to low memory requirements and global convergence properties. Many studies and modifications have been conducted recently to improve this method. In this paper we propose a new hybrid conjugate gradient coefficient. The parameter $\beta_k^{HT}$ is computed as a combination of $\beta_k^{HS}$ (Hestenes-Steifel formula), $\beta_k^{LS}$ (Liu –storey formula) and $\beta_k^{RMIL}$ (Rivaie formula) to exploit attractive features of each. The algorithm uses the exact line search. Numerical results are reported which shown that the proposed method is globally convergent for the objective function we use. On the other hand numerical computations for this new hybrid conjugate gradient method emphasizes the efficiency of it using the performance profile proposed by Dolan and More. Besides, most of our numerical results show that our method is very efficient when compared to the early CG coefficients for a given standard test problems. The numerical results also have shown that the new formula for $\beta_k$ performs far better than the original Hestenes-Steifel, Liu –storey and the Rivaie methods.

**Keywords:** Hybrid conjugate gradient method; exact line search; global convergence; conjugate gradient coefficient; unconstrained optimization.

# On second order perturbed state-dependent sweeping process

Doria Affane and Mustapha Fateh Yarou
LMPA Laboratory, Jijel University, Jijel, Algeria
Email: mfyarou@yahoo.com

## Abstract

Using a discretization approach, the existence of solutions for a class of second order differential inclusion is stated. The right hand side of the problem is governed by the so-called nonconvex state-dependent sweeping process and contains an unbounded perturbation, that is the external forces applied on the system. Thanks to some recent concepts of set's regularity and nonsmooth analysis, we extend existence results for nonconvex equi-uniformly subsmooth sets. The construction is based on the Moreau's catching-up algorithm.

**Keywords:** Differential inclusion, nonconvex sweeping process, subsmooth sets, unbounded perturbation.

# On wrapping of quasi Lindley distribution

Ahmad M. H. Al-khazaleh[1] and S. Alkhazaleh[2]
[1]Department of mathematics. Al-albayt University
Al-Mafraq - Jordan
ahmed_2005kh@yahoo.com
[2]Department of Mathematics, Faculty of science, Al-Zarqa University
Al-Zarqa - Jordan
shmk79@gmail.com

## Abstract

Directional data have many new and individual characteristics and tasks in modelling statistical analysis. In this paper, we suggested a new circular distribution called Wrapping Quasi Lindley Distribution (WQLD). We obtain the probability density function and derive the formula of cumulative distribution function, characteristic function, trigonometric moments and some related parameters for this WQLD. The maximum likelihood estimation method is used for estimation of parameters.

**Keywords:** Circular Statistics, Wrapping, Quasi Lindley, Trigonometric Moments.

# The attraction basins of several root finding methods, with a note about optimal methods

ObadahSaid Solaiman[1], IshakHashim[2] and Ayser Tahat[3]
[1]Preparatory year deanship, King Faisal University, 31982, Hofouf, Ahsaa, Saudi Arabia
E-mail: obadahmass@kfu.edu.sa*
[2]School of Mathematical Sciences, Faculty of Science & Technology, UniversitiKebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia E-mail: ishak_h@ukm.edu.my
[3]Department of Mathematics, Faculty of Science, Jerash University, 26150 Jerash, Jordan
E-mail: aysertahat@yahoo.com

## Abstract

Finding the solution of the equation $f(x) = 0$ when $f(x)$ is nonlinear is very important, as like this equation resulting out from many real life problems and applied sciences. Many iterative methods were proposed to solve nonlinear equations. These methods can be compared using different ways, for example; their convergence order, number of functions needed to be evaluated in each iteration, number of iterations needed for convergence, the CPU time required to achieve the accuracy needed, and efficiency index. In this work we use another way called the basins of attraction of the method. We consider six different methods of different orders and graph the attraction basins of the roots of several polynomials. Finally, we clarify the answer to the question: are the optimal methods always good for finding the solution of the nonlinear equations?

**Keywords:** Basin of attraction; Nonlinear equations; Iterative methods.

# $(S,T)$ −Normed doubt neutrosophic ideals of $BCK/BCI$-algebras

Anas Al-Masarwah[1]* and Abd Ghafur Ahmad[2]
[1]School of Mathematical Sciences, Faculty of Science and Technology Universiti Kebangsaan Malaysia, 43600 UKM Bangi Selangor DE, Malaysia
E-mail: almasarwah85@gmail.com*
[2]School of Mathematical Sciences, Faculty of Science and Technology Universiti Kebangsaan Malaysia, 43600 UKM Bangi Selangor DE, Malaysia
E-mail: ghafur@ukm.edu.my

## Abstract

Smarandache initiated the idea of neutrosophic sets as a tool for handling undetermined data. Neutrosophic set theory is widely used in several algebric structures, such as groups, rings and $BCK/BCI-$ algebras. At present, there exist no results on doubt neutrosophic ideals of $BCK/BCI-$ algebras using $t-$conorm and $t-$norm. First, the notions of $(S,T)$ normed doubt neutrosophic subalgebras and ideals of $BCK/BCI-$ algebras are introduced and the characteristic properties are described. Then, images and preimages of $(S,T)$ normed doubt neutrosophic ideals under homomorphism are considered. Moreover, the direct product and $(S,T)-$ product of $(S,T)-$ normed doubt neutrosophic ideals of $BCK/BCI-$ algebras are also discussed. Some recent results obtained by Jun and Kim, Agboola and Davvaz, and Kim are extended and strengthened.

**Keywords:** $BCK/BCI-$ algebra; Doubt neutrosophic subalgebra (ideal); $(S,T)-$ normed doubt neutrosophic subalgebra (ideal)

# Combinatorial Pell-Lucas identities

Taras Goy
Faculty of Mathematics and Computer Science, Vasyl Stefanyk Precarpathian National University,
57 Shevchenko St., Ivano-Frankivsk, 76018, Ukraine
E-mail: tarasgoy@yahoo.com

## Abstract

In this paper, we investigate some families of Toeplitz-Hessenberg determinants the entries of which are Pell-Lucas numbers. The obtained determinantal formulas may be rewritten as identities involving sums of products of Pell-Lucas numbers and multinomial coefficients.

**Keywords:** Pell-Lucas sequence; Pell-Lucas numbers; Toeplitz-Hessenberg matrix; Toeplitz- Hessenberg determinant; multinomial coefficient.

# Asymptotic modeling of Coulomb frictions Signorini problem of a linear membrane shell

M. E. Mezabia[1], A. Bensayah[2] and D. A. Chacha[3]
Département de math
UKM Ouargla
Email : [1]hadimzabi@gmail.com, [2]bensayahabd@gmail.com, [3]d_chacha@hotmail.com

## Abstract

In this research paper, we extend the study of Paumier, on the asymptotic modeling of Coulomb frictions Signorini problem of linear thin plate to a linear membrane shell using formal asymptotic expansions method. The result obtained is that the leading term u0 in the asymptotic expansion of covariant components of the displacement is chracterized by a two dimensional problem involves contravariant components of friction force contrary to result obtained by Paumier

**Keywords :** asymptotic analysis, Signorini problem, Coulomb friction, shell theory

# Solutions of Burgers-Lokshin equation with its properties

Saad N. Al-Azzawi[1] and Wurood R. Abd AL- Hussein[2]
[1]Department of Mathematics College of Science for Women, University of Baghdad.
[2]Al-Esraa University College – Baghdad – IRAQ
saadnaji58@gmail.com and wowomath91@yahoo.com

## Abstract

In this paper we shall solve Burger-Lokshin (BL) equation

$$\frac{\partial u}{\partial t} + c\frac{\partial u}{\partial x} + \varepsilon\frac{\partial^{\alpha} u}{\partial t^{\alpha}} + b\frac{\partial\left(\frac{u^2}{2}\right)}{\partial x} = 0$$

where $t > 0$

$$u(x,t)\big|_{t=0} = u^0(x)$$

$c > 0, > 0$ , $\alpha \in (0,1)$ , $b \geq 0$
by approximate method namely Sumudu transform. Also the statistical properties of the solution will be studied.

**Keywords:** Burger-Lokshin (BL) equation ,Fractional calculus, Caputo derivative, Sumudu transforms.

# A working on C*-algebra valued metric space and common coupled fixed points

Özen Özer[1] and Saleh Omran[2]
[1]Faculty of Engineering, Kırklareli University, 39100, Kırklareli, Turkey.
Mobile: +90 507 443 89 19,
E-mail address: ozenozer39@gmail.com
[2]Department of Mathematics, Faculty of Science, Taif University, Taif, KSA

## Abstract

In fixed point theory, Banach contraction principle and type of the metric space has a great importance. Banach contraction principle, which is very useful to solve integral equations and differential equations, is significant to determine existence and uniqueness theorem in mathematics. Also, there are many types of metric spaces in analysis. Since 2014, the concept of C*-algebra and some types of C*-algebra valued metric spaces have been worked. C*- algebra valued metric spaces $(X, \mathcal{A}, d)$ is defined for a unital C*-algebra $\mathcal{A}$, if $d: X \times X \rightarrow \mathcal{A}$ satisfies conditions of metric spaces in $\mathcal{A}$.

In this work, we focus on the concept of C*-algebra, Banach contracton principle and common coupled fixed points. Using iteration method, we demonstrate uniquness and existence of common coupled fixed points in a complete C*-algebra valued metric spaces. Also, we obtain some results on this theorem. Obtained results are useful and important for the literature of mathematics.

**Keyword:** Fixed Point Theory, $C^*$-Algebra, Banach Contraction Principle.

# On the solutions of quartic diophantine equation with Three Variables

Özen Özer[1] and M.A.Gopalan[2]
[1]Faculty of Engineering, Kırklareli University, 39100, Kırklareli, Turkey.
Mobile: +90 507 443 89 19,
E-mail address: ozenozer39@gmail.com
[2]Department of Mathematics, Shrimati Indira Gandhi College, Trichy-620 002,
Tamil Nadu, India

## Abstract

Diophantine equations have a central and a significant role in mathematics especially in number theory. It is an algebraic equation or a system of polynomial equations with several variables and high order to be solved in set of integers, set of rational numbers, or other number rings. It is not easy to solve Diophantine equations if the number of variables is more than the number of equations.
The paper proposes a method to find infinitely non zero solutions of quartic diophantine equation with three unknowns in set of integers. Then, several properties for solutions are demonstrated. Also, significant relations between special numbers and solutions are determined and one of open problems in the literature is completed/solved.

**Keywords:** Quartic Diophantine Equation, Integer solutions of Pell Equations, Linear Transformations, Special Sequences,

# Some non-extendible regular triple $P_s$ sets

Özen Özer
Faculty of Engineering, Kırklareli University, 39100, Kırklareli, Turkey.
Mobile: +90 507 443 89 19,
E-mail address: ozenozer39@gmail.com

## Abstract

Many open problems in Number Theory has been waiting to solve for a long time before. One of them is Diophantine 3-tuples $Ps$ which is defined as "sets with the property such that product of any two distinct elements adding $s$ integer is a square integer".
The purpose of this study is to determine some special non-extendible regular $Ps$ Diophantine 3-tuples for a fixed integer $s$. To get them, solutions of diophantine equations are considered. Some characteristic properties are determined for such sets. Results are demonstrated using some notions such as quadratic reciprocity law, Legendre symbols, quadratic residues, modular arithmetic and so on … from algebraic and elementary number theory.

**Keywords:** Diophantine Triples, Diophantine Equations, Integral Solutions, Quadratic Reciprocity Theorem**,** Legendre Symbol, Modular Arithmetic, Pell Equations.

# Hyers-Ulam instability of linear and nonlinear differential equations of second order

Maher Nazmi Qarawani
Department of Mathematics
AlQuds Open University
Palestine
Email: mkerawani@qou.edu

## Abstract

In this paper we have obtained integral sufficient conditions under which the zero solution of a nonlinear differential equation of second order with initial condition is unstable in the sense of Hyers and Ulam . We also have proved the Hyers -Ulam Instability of a linear differential equation of second order with initial condition. To illustrate the results we have given two examples.

**Keywords:** Hyers -Ulam, Instability, Nonlinear ,Linear, Differential equations.

# Inductive description of quadratic Lie triple systems

Amir Baklouti[1] and Samiha Hidri[2]
[1]Umm Al-Qura University, College of preliminary year,
Department of mathematics, P.O. Box 14035, Makkah Al-Mukarramah
21955, Saudi Arabia
[2]University of Sfax, Faculty of Sciences of Sfax,
Soukra 3018 Sfax POBox 802, Tunisia.
Email: ambaklouti@uqu.edu.sa.

## Abstract

We prove that any Jordan triple system is either a $T^*$-extension of a Jordan triple system or an ideal of codimension one of a $T^*$-extension. We introduce also the notion of double extension of Lie triple systems so that we can give an inductive description of quadratic Lie triple systems.

**Keywords:** Jordan triple system, Lie triple system, $T^*$-extension, double extension, quadratic Lie algebra, TKK construction:.

# Introduction to Q-neutrosophic soft fields

Majdoleen Abu Qamar[1], Nasruddin Hassan[2] & Abd Ghafur Ahmad[3]
[1,2,3]School of Mathematical Sciences, Faculty of Science and Technology Universiti Kebangsaan Malaysia, 43600 UKM Bangi Selangor DE, Malaysia
E-mail: [1]mjabuqamar@gmail.com*, [2]nas@ukm.edu.my, [3]ghafur@ukm.edu.my

## Abstract

As an extension of neutrosophic soft sets, $Q$-neutrosophic soft sets were established to deal with two-dimensional indeterminate data. Different hybrid models of fuzzy sets were utilized to different algebraic structures, for example groups, rings, fields and lie-algebras. A field is an essential algebraic structure, which is widely used in algebra and several domains of mathematics. The motivation of the current work is to extend the thought of $Q$-neutrosophic soft sets to fields. In this paper, we define the notion of $Q$-neutrosophic soft fields. Structural characteristics of it are investigated. Moreover, the concepts of homomorphic image and pre-image of $Q$-neutrosophic soft fields are discussed. Finally, the cartesian product of $Q$-neutrosophic soft fields is defined and some related properties are discussed.

**Keywords:** Neutrosophic soft field; Neutrosophic soft set; $Q$-neutrosophic soft field; $Q$-neutrosophic soft set

# Mapping properties of mixed fractional differentiation operators in Hölder spaces

T. Mamatov[1] and M. Elmurodov[2]
[1]Department of Higher mathematics, Bukhara Technological Institute of Engineering, Bukhara, Uzbekistan
E-mail: mamatov.tulkin@mail.ru
[2]Student Department of Higher mathematics, Bukhara Technological Institute of Engineering, Bukhara, Uzbekistan
E-mail: mamatov.tulkin@mail.ru

## Abstract

We study mixed fractional derivative in Marchaud form of function of two variables in Hölder spaces of different orders in each variables. We consider Hölder spaces defined both by first order differences in each variable and also by the mixed second order difference, the main interest being in the evaluation of the latter for the mixed fractional derivative in the cases Hölder class defined by usual Hölder condition.

**Keywords:** functions of two variables, fractional derivative of Marchaud form, mixed fractional derivative, mixed fractional integral, Hölder space.

# Asymptotic Behavior of diffusive complex networks of FitzHugh-Nagumo type. Application to Neuroscience

M.A. Aziz-Alaoui
Normandie Univ., UNIHAVRE, LMAH, FR-CNRS-3335, ISCN,
BP 540, 76600 Le Havre, France
E-mail: aziz.alaoui@univ-lehavre.fr

## Abstract

Neuroscience consists of the study of the nervous system and especially the brain. The neuron is an electrically excitable cell processing and transmitting information by electrical and chemical signaling, the latter via synapses, specialized connections with other cells. A.L.Hodgkin and A.Huxley proposed the first neuron model to explain the ionic mechanisms underlying the initiation and propagation of action potentials in the squid giant axon. Here, we are interested in the asymptotic behavior of complex networks of reaction-diffusion systems of such neuron models. We show the existence of the global attractor and the identical synchronization for the network. We determine analytically, for a given network topology, the onset of such a synchronization. We then present numerical simulations and heuristic laws giving the minimum coupling strength necessary to obtain the synchronization, with respect to the number of nodes and the network topology.

**Keywords**: Complex Networks, Partial Differential Equations, Synchronization, Neuroscience

# On credibility premiums under the weighted balanced loss function and the Esscher premium principle

Metiri Farouk and Zeghdoudi Halim
Badji Mokhtar university, Annaba, Algeria
E-mail address: fmetiri@yahoo.fr

## Abstract

This paper focuses on the use of the weighted balanced loss function (WBLF henceforth) under the Esscher principle of which we explore the modern practice of credibility theory to obtain an new suitable prmeium which arranges both parts: the insurer and the insured. We obtain a distribution-free approach under the WBLF and the Esscher premium by using a minimization technique. Also, to illustrate the theoretical conclusions, we discuss the consistency of the credibility premium generated by this distribution-free approach using a numerical simulation.

# Solving the beam deflection problem using al-tememe transforms

Emad Kuffi[1], Elaf Sabah Abbas[2] and Sarah Faleh Maktoof

Communication Engineering department, Al-Mansour University Collage, Baghdad, Iraq

[1]E-mail: emad.kuffi@muc.edu.iq

[2]E-mail: elaf.abbas@muc.edu.iq

## Abstract

In this paper, we solve the deflection of beam problem by using two new transforms, which are complex AL-Tememe and AL-Tememe transforms, and compares the results of them with each other. The results (solutions) that are appeared from both transforms to solve the problem of the beam deflection are identical.

**Keywords:** Complex AL-Tememe transform; AL-Tememe transform; deflection of the beam, differential equations; famous function; Inverse of AL-Tememe transform; Inverse of complex AL-Tememe transform; uniform distributed load.

# Bifurcation, Chaos and Control of a two Dimensional Discrete-Time System with Fractional Order

Khennaoui Amina Aicha[1], Ouannas Adel[2], Zaid Odibat[3], Viet-Thanh Pham[4] and Giuseppe Grassi[5]

[1]Departement of Mathematics and Computer Sciences, University of Larbi Ben M'hid Oum El Bouaghi, Algeria.

[2] Department of Mathematics and Computer Science University of Larbi Tebessi, Tebessa, Algeria

[3]Department of Mathematics, Faculty of Science, Al-Balqa Applied University, Salt 19117, Jordan

[4]Faculty of Electrical and Electronic Engineering, Thanh Tay Institute for Advanced Study (TIAS), Thanh Tay University, Yen Nghia, Ha-Dong district, Hanoi 100000, Viet Nam

[5]Universita del Salento, Dipartimento Ingegneria Innovazione, 73100 Lecee, Italy

E-mail: kamina_aicha@yahoo.fr.

## Abstract

In this paper we aim to study the dynamical behavior of two-dimensional map with fractional order between 0 and 1. The fractional order map is obtained using the Caputo like difference operator. The dynamical properties of the new map are investigated by using the bifurcation diagram, Largest Lyapunov exponent, phase portraits; entropy and C0 algorithm where the fractional order and system parameters are varied. Results shows that the generalized map have rich dynamical behavior than the corresponding integer order map. In addition a control law for stabilizing the states of the fractional order map is considered. Some numerical simulations are preformed to confirm the results.

# Faber polynomial coefficient bounds of the meromorphic Bi-univalent functions associated with Jackson $(p, q)$-derivative

Abdullah Alsoboh, Maslina Darus
School of Mathematical Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia.
Email: P92712@siswa.ukm.edu.my

## Abstract

In this article, we introduce a new subclass of meromorphic bi- univalent functions, using $(p;\ q)$ −Jackson derivative. We obtain the general coefficient estimates $a_n$ for such functions belonging to this subclass and examine their early coefficient bounds by applying Faber polynomial coefficient expansions.

**Keywords:** Meromorphic functions, bi-univalent functions; Faber polynomial; q-calculus.

# Recent advances in some numerical and operator inequalities

Mohammad Sababheh
Princess Sumaya University for Technology
sababheh@psut.edu.jo

## Abstract

In this talk, we introduce the audience to the ideas that led to several improvements of celebrated inequalities in functional analysis. In particular, we clarify the role of convexity behind these inequalities; where convex functions seem to be a key tool for obtaining such inequalities. Once the scalar inequalities are clarified, we guide the audience on how to obtain operator inequalities from simple scalar inequalities.

# On the general solution and limit of two dimensional decoupled systems of difference equations

Saleem Al-Ashhab
Department of Mathematics, Al-albayt University
P. O. Box 130040
Mafraq, Jordan
E-mail: ahhab@aabu.edu.jo

## Abstract

In this paper we study systems of difference equations numerically and theoretically. These systems were considered by many researchers. We will focus on the general form and the limits. We consider different orders of the difference systems. We use in certain cases the computer to verify the limit properties

**Keywords:** difference equations; limit; Gamma function

# Existence result for impulsive functional semilinear differential inclusions of fractional order with Nonlocal conditions

Djamila Seba, Assia Boudjerida and K. Laoubi
Dynamic of Engines and Vibroacoustic Laboratory, Faculty of Engineer's Sciences,
University M'hamed Bougara of Boumerdes, Algeria.
seba@univ-boumerdes.dz

## Abstract

In this work, we prove an existence result of integral solutions defined on a real compact interval for a class of impulsive functional differential inclusions with fractional order and nonlocal conditions, in the case when the linear part is a nondensely defined operator.
The main tool is an appropriate fixed point theorem, integrated semigroup and fractional calculus.

**Keywords:** Functional differential inclusions, Fractional calculus, Semigroups, Nonlocal conditions, Fixed-point theorem, Existence of solution, Nondense domain, Impulses.

# The ring strcture in the set of E-convex sets

Nada Mohammed Abbas[1] and Ruma Kareem K. Ajeena[2]
Mathematics Department, Education College for Pure Sciences, University of Babylon, Babil, Iraq
[1]nadaalsafar333@gmail.com and [2]ruma.usm@gmail.com*

## Abstract

A convex analysis especially the convex sets and E-convex sets have been used widely in several mathematical areas. They are employed to solve different mathematical problems. The convex sets and their properties have been studied by some researchers. The E-convex sets, where E is a map from $R^n$ into$R^n$ and the important algebraic properties have been discussed. In this work, a new applying on the set $V$of the E-convex sets $M_i = 1,2, \dots, n$ with the binary operations which are addition $+$ and multiplication $*$ is proposed.
The addition operation $+$ is defined by $(x_1, x_2, \dots, x_n) + (y_1, y_2, \dots, y_n) = (x_1 + y_1, x_2 + y_2, \dots, x_n + y_n)$ where $x_i, y_i$belong to Mi for $i = 1,2, \dots, n$ Whereas, the definition of the operation $*$ is given by $(x_1, x_2, \dots, x_n) * (y_1, y_2, \dots, y_n) = (x_1y_1, x_2y_2, \dots, x_ny_n)$. The axioms of the commutative ring on the mathematical system $(V, +, *)$ are proved mathematically. As well as, a subset $S$ of the E-convex sets on the same binary operations$+$ and $*$ are proved as a subring $(S, +, *)$ of the ring $(V, +, *)$.

**Keywords:** convex sets; E-convex sets; ring structure; subring structure.

# Bipolar complex neutrosophic soft set theory

Ashraf Al-Quran[1] and Shawkat Alkhazaleh[2]
[1]Department of Mathematics , Jerash University, Jerash 26150,Jordan
E-mail: a.quraan@jpu.edu.jo*
[2]Department of Mathematics , ZarqaUniversity, Zarqa 13132,Jordan
E-mail:shmk79@gmail.com

## Abstract

We establish the concept of bipolar complex neutrosophic soft set (BCNSS) by extending the concept of bipolar neutrosophic soft set (BNSS) from real space to the complex space. BCNSS is a hybrid structure of bipolar complex neutrosophic set (BCNS) and soft set, thus making it highly suitable for use in decision-making problems that involve positive and negative indeterminate data where the extra information provided by the phase terms of the complex numbers play a key role in determining the final decision. Based on this new concept we define the basic theoretical operations such as complement, subset, union and intersection operations. The basic properties are also verified.

**Keywords:** bipolar complex neutrosophic set; bipolar neutrosophic soft set ;complex neutrosophic set; neutrosophic soft set.

# Application of residual power series method for solving nonlinear Fredholm integro-differential equations in fractional sense

Rania Saadeh[1], Reem Edwan[2], Mohammad Alaroud[3], Mohammed Al-Smadi[4], Omar Abu Arqub[5] and Shaher Momani[5,6]

[1]Department of Mathematics, Faculty of Science, Zarqa University, Zarqa 13110, Jordan

[2]Department of Mathematics, Taibah University, Madinah Munawwarah, Saudi Arabia

[3]Center for Modelling and Data Science, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor DE, Malaysia

[4]Applied Science Department, Ajloun College, Al-Balqa Applied University, Ajloun 26816, Jordan

[5]Department of Mathematics, The University of Jordan, Amman 11942, Jordan

[6]Nonlinear Analysis and Applied Mathematics (NAAM) Research Group, Faculty of Science, King Abdulaziz University, Jeddah 21589, Kingdom of Saudi Arabia

E-mail: rsaadeh@zu.edu.jo

## Abstract

This work aims to develop a reliable approximation tool to solve the nonlinear fractional integro-differential equations that include a Fredholm operator under Caputo fractional concept. The proposed technique is mainly based on the use of residual power series method combining the generalized Taylor's series and residual error function. Approximate solutions are represented in the convergent series formula. This technique can be applied directly to the solutions of nonlinear phenomena without the need for linearity or set any limitations on the problem's nature or the number of grid points. To verify the accuracy and applicability of this technique, two numerical examples are performed. The results are carried out using the Mathematica software package, which indicate that the method is straightforward, and convenient for approximate rough solutions for nonlinear fractional models arising in various fields of applied science.

**Keywords:** Caputo fractional derivative; residual power series method; analytical solution; Fredholm integro-differential equations.

# Studying the effect of some variables on the economic growth using latent roots method

Mowafaq Muhammed Al-kassab, Adnan M.H. Al-sinjary and Dilnas S. Younis
Department of Mathematics Education, Faculty of Education
Tishk International University
Department of Statistics & Informatics College of Mathematics & Computer Sciences
Mosul University
Mowafaq.muhammed@ishik.edu.iq, Adnanalsinjary@yahoo.com,
Dilnasyonis@gmail.com

## Abstract

Different kinds of estimators have been proposed as an alternative to the ordinary least squares for estimating the coefficients of the multiple linear regression model in the presence of multicollinearity. We estimated the parameters of this linear model by two methods: the least squares and the latent roots method. A comparison between these two methods is given through the application of the economic growth data of the UAE to study the effect of the population size, exchange rate, total exports and the total imports on the economic growth. It is shownthat all the explanatory variables using the latent roots method have an effect on the economic growth and this effect is significant, whereas these variables are not significant using the least squares method.

**Keywords:** Regression; Multicollinearity; Least Squares; Correlation Matrix; Eigen Values; Eigen Vectors; Latent Roots.

# Some properties of $\beta -$ compact spaces

Heyam Hussein Al-Jarrah and Amani Rawshdeh
Department of Mathematics, Faculty of science,
Yarmouk University,
Irbid-Jordan.
hiamaljarah@yahoo.com , heyam@yu.edu.jo

## Abstract

In 1985, Abd El-Monsef and Kozae introduced and studied a strong version of compactness defined in terms of $\beta -$ open subsets of a topological space which they called $\beta -$ compact. A topological space $X$ is said to be $\beta -$ compact if every $\beta -$ open cover of $X$ has a finite sub-cover. In this paper, first we introduce and study the notion of $N\beta -$open sets as a generalization of $N -$open and $\beta -$ open sets. Then, by using $N\beta -$open sets, we obtain new characterizations of $\beta -$compact spaces.

# On a class of harmonic functions defined by a convolution differential operator

Mohammad Al-Kaseasbeh
Department of Mathematics, Jerash University, Jerash 26150, Jordan
Email: zakariya.alkaseasbeh@gmail.com

## Abstract

A class of complex-valued harmonic univalent function defined by convolution operator is introduced. Coefficient bounds, distortion theorem, and other properties of this class are obtained.

# Stochastic delay differential equations of prey predator system with hunting cooperation: analytic and numeric

Fathalla A. Rihan and Hebatallah J. Alsakaji
Department of Mathematical Sciences, College of Science, United Arab Emirates University, Al-Ain, 15551, UAE

## Abstract

In this paper, we investigate the dynamics of a stochastic delay differential equations (SDDEs) of predator-prey system with hunting cooperation on predator. The prove of the existence of global positive solution has been discussed. We use Milstein's scheme, to solve SDDEs of the prey-predator system. Sufficient criteria for global existence are obtained. The increase of the noise intensity has a drastic impact on the dynamical behavior of both species with or without the delay effect. Time-delay plays a vital role in population dynamics of prey-predator, which has been recognized to contribute critically to the stable or unstable outcomes of prey population due to predation. Illustrative numerical examples are provided to show the effectiveness of the theoretical results.

**Keywords:** Hunting cooperation; Milstein's scheme; Stochastic Prey-Predator model; Time-delay

# General construction of the Bosonic Hamiltonian

Ayed E. Alsharafat
Department of Physics, Faculty of Science, University of Jordan, Amman, Jordan E-mail: a.sharafat1979@gmail.com

## Abstract

The general decomposition of the bosonic Hamiltonian is obtained from a noninteracting quantum field theory in which each bosonic mode with a given frequency $(\omega)$ is considered as a sum of bosonic mode whose frequency is $(2^m\ \omega)$ and $m$-fermionic modes with different frequencies $(2^{m-r}\omega)$, where $m = 1, 2, 3, \ldots$ and $r = 1, 2, \ldots m$. As a consequence of this decomposition a general factorization formula that relate the bosonic and fermionic partition functions at different temperatures is derived. Our factorization formula is then used to obtain a general identity in hyperbolic trigonometry.

**Keywords:** Non-interacting quantum field theory, Partition functions, Partition theory, Factorization formula, Combinatorial methods.

# Local existence and blow up of solutions for a time-space fractional evolution system with nonlinear time-nonlocal source terms

Belgacem Rebiai and Mokhtar Kirane
LAMIS Laboratory, Department of Mathematics and Informatic, University of Larbi Tebessi, Tebessa, 12002, Algeria
E-mail: brebiai@gmail.com*
LaSIE, Faculté des Sciences, Pole Sciences et Technologies, Université de La Rochelle, Avenue M. Crepeau, La Rochelle Cedex, 17042, France
E-mail: mkirane@univ-lr.fr

## Abstract

In this paper, we are concerned with local existence and blow-up of a unique solution to the Cauchy problem for a time-space fractional evolution system with time-nonlocal source terms of polynomial growth. At first, we prove the existence and uniqueness of the local mild solution by the Banach contraction mapping principle. Then, we show that such a mild solution is a weak solution and we establish a blow-up result by the test function method with a judicious choice of the test function. Finally, we establish an estimate of the life span of blowing up solutions under some suitable conditions.

**Keywords:** Fractional derivatives and integrals; nonlinear evolution equations; local existence; blow-up; life span

# Solving fractional Volterra integro-differential equations of order $2\beta$ using fractional power series method

Reem Edwan[1], Rania Saadeh[2], Shatha Hasan[3], Mohammad Alaroud[4], Omar Abu Arqub[5], Mohammed Al-Smadi[2] and Nabil Shawagfeh[5]

[1]Department of Mathematics, Taibah University, Madinah Munawwarah, Saudi Arabia

[2]Department of Mathematics, Faculty of Science, Zarqa University, Zarqa 13110, Jordan

[3]Applied Science Department, Ajloun College, Al-Balqa Applied University, Ajloun 26816, Jordan

[4]Center for Modelling and Data Science, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor DE, Malaysia

[5]Department of Mathematics, The University of Jordan, Amman 11942, Jordan

E-mail: rsaadeh@zu.edu.jo

## Abstract

The solution of fractional integro-differential equations, in the Volterra sense, is very important to describe the behavior of linear and non-linear problems. In this article, we discuss the analytical approximate solution for a class of fractional Volterra integro-differential equations of order $2\beta$, where $0 < \beta \leq 1$. The fractional power series method (FPSM) is applied to provide the analytical solutions in the form of rapidly convergent fractional power series (FPS) depending on the residual error function and Taylor series generalized formula under the Caputo sense. In order to validate the effectiveness, potential, and simplicity of the proposed approach in solving such equations, numerical examples are performed. The analysis of the obtained results shows that the FPSM is simple, straightforward and appropriate tool for solving various forms of these equations.

**Keywords:** Fractional power series method,fractional Volterra integro-differential equation, Caputo fractional derivative.

# Solving nonlinear fuzzy fractional IVPs using fractional residual power series algorithm

Mohammad Alaroud[1], Rania Saadeh[2], Mohammed Al-Smadi[3], Rokiah Rozita Ahmad[1], Ummul Khair Salma Din[1] and Omar Abu Arqub[4]

[1]School of Mathematical Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor,Malaysia.
E-mail: mohammadaloroud@yahoo.com

[2]Department of Mathematics, Faculty of Science, Zarqa University, Zarqa 13110, Jordan

[3]Department of Applied Science, Ajloun College, Al-Balqa Applied University, Ajloun 26816, Jordan

[4]Department of Mathematics, The University of Jordan, Amman 11942, Jordan

## Abstract

Fuzzy initial value problems of fractional order play a vital role in modeling several realism matters arising in the natural sciences and engineering fields. In this paper, the fuzzy approximated solutions of nonlinear fuzzy fractional initial value problems under the assumption of strongly generalized differentiability have been provided using fractional residual power series (FRPS) method. The solution methodology of the proposed algorithm depends on producing the solutions in $r$-cut representations with rapidly convergence fractional power series (FPS). Furthermore, the FRPS technique does not need to linearization, limitations or perturbation of the variables, as well as avoiding the round-off errors. Numerical problem is performed to demonstrate the accuracy, performance, and reliability of the present method. The effects of the fractional order $\propto$and the parameter $r$ have been shown graphically and quantitatively. The results obtained indicate to an agreement well between the fuzzy exact and fuzzy approximated solutions, as well as satisfy the symmetry convex triangular fuzzy number. Therefore, the FRPS method is an accurate, effective, simple and suitable tool to apply in finding the solutions of such problems.

**Keywords:** Strongly generalized differentiability, fractional residual power series method, fuzzy number, nonlinear fuzzy fractional initial value problems.

# The bifurcation and stability of the solutions of the Boussinesq equations

Mohammad Yahia Ibrahim Awajan and Ruwaidiah Idris
School of Informatics and Applied Mathematics Universiti Malaysia Terengganu (UMT),
21030 Kuala Nerus, Malaysia Terengganu
E-mail:mohammadawajan8@gmail.com* E-mail: ruwaidiah@umt.edu.my

## Abstract

The study determined the bifurcation and stability of the solutions of the Boussinesq equations as well as the onset of the Rayleigh-Benard convection. The article established the nonlinear theory for this problem using a new notion of bifurcation known as attractor bifurcation. This article considered the theory that comprises the following three perspectives. We initially deal with the problem that bifurcates from the trivial solution an attractor $AR$ while the Rayleigh number $R$ intersects the first critical Rayleigh number $Rc$ for all physically boundary conditions, despite the multiplicity of the eigenvalue $Rc$ for the linear problem. Hence, secondly, the study considered the bifurcated attractor $AR$ as asymptotically stable. Lastly, the bifurcated solutions are also structurally stable when the spatial dimension is two, and are classified as a bifurcated solution as well. Furthermore, the technical method explained here provides a means, which can be adopted for many different problems in bifurcation and other pattern formation that are related.

**Keywords:** Rayleigh-Benard Convection; Dynamic bifurcation; Boussinesq equation; Rayleigh number; Attractor bifurcation.

# Optimum Stratum Boundaries using artificial Bee Colony and particle Swarm optimization

Muhammad A. Alhasawy[1] and Mowafaq M. Al-kassab[2]
[1]Department of Statistics & Informatics, College of Administration & Economic, University of Duhok
Email: mn.hasawy@gmail.com
[2]Department of Mathematics Education , Tishk International University
Email: Mowafaq.muhammed@ishik.edu.iq

## Abstract

In stratified sampling , is use to gain more precision than other methods of sampling, a heterogeneous population is divided into subpopulations, each of which is internally homogeneous. The main problem arising in stratified sampling is to obtain the optimum boundaries with minimum variance . Several numerical and computational methods have been developed for this purpose , some of them apply to highly skewed populations and others apply to any kind of populations This paper proposes an Artificial Bee Colony (ABC) algorithm to obtain the optimum of stratum boundaries depending on Neyman Allocation The ABC algorithm is used on two groups of populations and a comparative study with Particle Swarm Optimization (PSO) is given . The numerical results show the ability of the proposed algorithm to find the optimum stratum boundaries for a set of standard populations and various standard test functions compare with (PSO) algorithms.

**Keywords :** Stratified random sampling **:** Neyman Allocation; Artificial Bee Colony ; Particle Swarm Optimization Optimum Stratum Boundaries .

# Classification and Diagnosis of Chronic Kidney Disease using Intelligent Techniques and Logistic Regression

Omar Qusay Alshebly[1] and Rizgar Maghdid Ahmed[2]
[1]Mosul University, College of Computer science and Mathematics, Department of Statistics and Informatics
omarqusay@uomosul.edu.iq
[2]Salahaddin University, College of Administration and Economic, Department of Statistics and Informatics
rizgar.ahmed@su.edu.krd

## Abstract

During the past few years, the number of classification techniques has increased with the rapid growth of technology which depends on Machine Learning. In recent times Machine Learning one of the areas of Artificial Intelligence has been widely used in order to assist medical experts and doctors in the prediction and diagnosis of different diseases. In this study, we applied three various of machine learning algorithms to a problem in the domain of medical diagnosis and analyzed their efficiency in prediction the results. The problem selected for the study is the diagnosis and factors affecting of the Chronic Kidney Disease based on a blood test (serum) for a group of presence and absence patients. The dataset used for the study consists of 153 cases and 11 attributes of CKD patients. The objective of this research work is to compare the performance of Logistic Regression (LR), Artificial Neural Networks (ANNs) and Support Vector Machine (SVM) classifiers on the basis of criteria its Accuracy, Sensitivity, Specificity, and AUCROC for CKD prediction. From the experimental results it is observed that the performance of SVM classifier is better than the other classifiers. Also, through the final fitted models used that the most important factors affecting that have a clear impact on chronic kidney disease patients are Creatinine and Urea.

**Keywords**: Classification, Logistic Regression, Artificial Neural Networks, Support Vector Machine, Chronic Kidney Disease, Accuracy, Area under Curve (ROC).

# Fitting structural measurement error model using repetitive wald-type procedure

Ro'ya S. Al Dibi'I and Amjad D. Al-Nasser
Department of Statistics, Yarmouk University, Irbid, Jordan
E-mail: Royaaldebei88@yahoo.com, E-mail: amjadn@yu.edu.jo

## Abstract

In this paper, fitting structural regression model when both variables are subject to error is considered using a new estimation procedure. The new estimation procedure is a repetitive procedure extension to the Wald estimation method. A Monte Carlo experiments are conducted to study the performance of the new estimators and the results are compared with the classical two-group and three-group estimators in terms of the mean squared error. Moreover, a real data analysis to study the relationship between the human development index and the national gross domestic product is discussed.

**Keywords**: Error-in-Variables Model, Wald Estimators, Human Development Index.

# Fractional Integral Formulas Involving (p-k)-Mittag-Leffler Function

AML M. Shloof[1], Mehar Chand[2] and Shawkat Al-Khazaleh[3]
[1]Department of Mathematics, Faculty of Science, Al-Zintan University, (Libya)
[2]Department of Mathematics, Baba Farid College, Bathinda-151001, (India)
[3]Department of Mathematics, Faculty of Science, Zarqa University, (Jordan)

## Abstract

The objective of the paper is to introduce certain fractional integral formulas of (p-k)-Mittag-Leffler Function function by using the generalized fractional integral operators (the Marchichev- Saigo-Maeda operators). Further integral formulas are also obtained involving Saigo and Riemann-Lioville integral operators as their special cases.

**Keywords:** (p-k) Pochhemmer symbol, Fractional Kinetic Equation, (p-k)-Mittag-Leffler Function function, Laplace Transform.

# Introducing an improvement HPM using Sumudu transform and implementation for solving Klein-Gordon equation

M. M. Khader[1,2], Shawkat Alkhazaleh[3] and Aml Shloof[4]
[1]Department of Mathematics and Statistics, College of Science, Al-Imam Mohammad Ibn Saud Islamic University (IMSIU), Riyadh, Saudi Arabia
[2]Department of Mathematics, Faculty of Science, Benha University, Benha, Egypt
[3]Department of Mathematics, Faculty of Science, Zarqa University, Jordon
[4]Department of Mathematics, Faculty of Science, Al-Zintan University, Libya.
mohamed.khader@fsc.bu.edu.eg, shmk79@gmail.com, aml.sh@uoz.edu.ly

## Abstract

This article is devoted to introduce an improvement of homotopy perturbation method using Sumudu transform method (HPSTM) and implement it to solve the Klein-Gordon equation (KGE). Further, the same problem is solved by Sumudu decomposition method. To obtain the exact solution in the case of linear equations we used the Laplace transform and the Padé approximation. The results obtained by the two methods are in agreement and hence the proposed technique may be considered an alternative and efficient method for finding approximate solutions of KGE. Furthermore, HPSTM has an advantage over the Sumudu decomposition method (SDM) is that it solves the nonlinear problems without using Adomian's polynomials. Some numerical examples are presented to validate the proposed techniques.

**Keywords**: Nonlinear Klein-Gordon equation; Homotopy perturbation Sumudu transform method; Sumudu decomposition method; Padé approximation.

# The dynamical behavior of stage structured Prey-Predator model in the presence of harvesting and toxin

Moayad H. Ismaeel[1] and Azhar Abbas Majeed[2]
[1]Department of Mathematics, College of Science, University of Baghdad, Baghdad,10071, Iraq
E-mail: moaed1983@yahoo.com*
[2]Department of Mathematics, College of Science, University of Baghdad, Baghdad, 10071, Iraq

E-mail: azhar_abbas_m@scbaghdad.ed

## Abstract

In this paper, the prey- predator model with stage-structured in prey as well as predator, where both species are subjected to harvesting has been considered. In which the prey is directly infected by some external toxic substances. The toxic infection is indirectly transmitted to the predator during the feeding process. The model is a modified version from the classic Lotka-Volterratype of functional response has been proposed. The conditions, which guarantee the existence of' equilibrium points, have been investigated. Uniqueness and' boundedness of the solution of the system are proven. The local and global dynamical behaviors are discussed and analyzed. Finally, numerical simulations are carried out not only to confirm the theoretical results obtained, but also to show the effects of' variation of each parameter on the proposed model.

**Keywords:** Prey-predator, functional response, stage- structure, stability analysis, Lyapunove function.

# Exponentiated q-Exponential Distribution

Islam Bataineh, Amjad Al-Nasser and Mohammad Al-Talib
Department of Statistics, Science Faculty, Yarmouk University,
21163 Irbid, Jordan
s.analysis@yahoo.com
amjadn@yu.edu.jo
m.altalib@yu.edu.jo

## Abstract

In this paper, we investigate the properties of the exponentiated q-exponential distribution. The distribution has been compared with the q-exponential distribution in terms of the moment measures, distribution measures, survival function and failure rate function. Also, the maximum likelihood estimators of the unknown parameters in both distributions have been investigated. Finally, a real time to event data analysis is discussed.

**Keywords:** Exponentiated Family, hazard function, Survival Analysis.

# Generalizations of Singular Value Inequalities Related to Block Matrices

Ahmad Abu Rahma
Zarqa University, Zarqa, Jordan
ahmadrahma50@yahoo.com

## Abstract

We prove several singular value inequalities related to positive semidefinite block matrices. A generalization of arithmetic geometric mean inequality is given.

# Relation on $S$ -permutable subgroups

Doaa Mustafa Alsharo [1]
Department of Applied Science, Ajloun College, Al-Balqa University, Ajloun 26816, Jordan*
E-mail: dmalsharoa@yahoo.com.

## Abstract

A subgroup $H$ of a group $G$ is said to permute with a subgroup $K$ if $HK$ is a subgroup of $G$. $H$ is said to be permutable in $G$ if it permutes with all the subgroups of $G$. A subgroup H is called $S-$permutable in $G$. This concept was introduced by Kegel in 1962, who showed such subgroups are necessarily subnormal. In this paper will give some relation and examples on some known finite group.

**Keywords:** Permutable; S-permutable.

# Information-theoretic estimation approach: tutorial and illustration

Sondos Aldamen, Amjad D. Al-Nasser and Mohammad Al-Talib
Department of Statistics, Science Faculty, Yarmouk University, 21163 Irbid, Jordan
sondos.aldamen@yu.edu.o

## Abstract

In this tutorial, the information theoretic estimation approach as proposed by "Golan, A., G. Judge, D. Miller. (1996) [*Maximum entropy econometrics: Robust estimation with limited data.* New York: John Wiley and Sons]" for estimating a nonlinear regression model will be illustrated. The tutorial is divided into two parts; theoretical and empirical. The theoretical illustration will be used for estimating the unknown parameters of the quadratic regression model. However, the empirical illustration will study the performance of using different entropy measures (i.e., Shannon, Renyi and Tsallis) in estimating the probability of a discrete event.

**Keywords**: Generalized Maximum Entropy, Entropy Measures, Jayne's dice Problem, Nonlinear Regression.

# Generalizations of the Aluthge Transform of Operators

Khalid Shebrawi[1], Mojtaba Bakherad[2]
[1]Department of Mathematics, Al-Balqa Applied University, Salt, Jordan
[2]Department of Mathematics, Faculty of Mathematics, University of Sistan and Baluchestan, Zahedan, I.R.Iran.
00962791993462
shebrawi@gmail.com

## Abstract

Let $A$ be an operator with the polar decomposition $A=U|A|$. The Aluthge transform of the operator $A$, denoted by $\tilde{A}$, is defined as $\tilde{A}=|A|^{\frac{1}{2}}U|A|^{\frac{1}{2}}$. In this paper, first we generalize the definition of Aluthge transformfor non-negative continuous functions $f$, $g$ such that $f(x)g(x) = x$ $(x\geq 0)$. Then, by using this definition, we get some numerical radius inequalities. Among other inequalities, it is shown that if $A$ is bounded linear operator on a complex Hilbert space $H$, then

$$h(w(A))\leq \frac{1}{4}\left\|h\left(g^2(|A|)\right)+h\left(f^2(|A|)\right)\right\|+\frac{1}{2}h\left(w\left(A_{f,g}\right)\right),$$

where $f$, $g$ are non-negative continuous functions such that $f(x)g(x) = x$ $(x\geq 0)$, $h$ is a non-negative and non-decreasing convex function on [0;1) and $A_{f,g} = f(|A|)Ug(|A|)$.

# Constructing a new mixed probability distribution (quasi-Lindely) with estimation of Hazard rate function

Inaam Rikan Hassan
University of Information Technology & Communications, Baghdad, Iraq
drinrh@uoitc.edu.iq

## Abstract

In this paper the two parameters mixed probability distribution from exponential p.d.f. (β), and two parameters Gamma(β,α), which is called (Quasiy-Lindely) is introduced, the p.d.f. is defined and also the CDF and Risk function and hazard function are estimated using methods of moments and maximum likelihood and L-moment. The comparison is done through simulation using different values of sample size n and different set of initial values of parameters (β,α) and all the results obtain using (function fsolve) in program (MATLAB R2012a) and function x=fsolve(fun, xo) and all the results of estimation are explained in tables, and also conclusions and referenced are exposed.

**Keyword:** one exponential (β), two parameters Gamma (2, β), Moments method estimators (MOM), maximum likelihood estimators (MLE), method of linear moment (MLM), mean square error (MSE).

# Nilpotent elements and extended symmetric rings

Wafaa, Mohammed Fakieh
Department of Mathematics, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia
E-mail: wfakieh@kau.edu.sa

## Abstract

An endomorphism $\alpha$ of a ring R is called weak symmetric if whenever the product of any three elements of a ring R, abc, is a nilpotent element of R, then so is ac$\alpha$ (b). A ring R is called weak $\alpha$-symmetric if there exist a weak symmetric endomorphism $\alpha$ of R. The notion of weak $\alpha$-symmetric ring is a generalization of $\alpha$-symmetric rings as well as an extension of symmetric rings. In this paper, we investigate characterization of weak $\alpha$-symmetric and there related properties including extensions: In particular, weshow that every semicommutativeand weak $\alpha$-symmetric ring is weak $\alpha$-skew Armendariz. We also proved that, thesemicommutative ring is weak $\alpha$-symmetric if and only if the polynomial ring R[x] of R is weak $\alpha$-symmetric.

**Keywords:** semicommutative ring; symmetric ring; weak α-symmetric ring; weak α-skew Armendariz rings **.**

# On a new integral operator and extension to Boehmian spaces

Shrideh K. Q. Al-Omari

## Abstract

In this paper we investigate the extension to the generalized Natural transform operator on sets of generalized functions. A set of delta sequences and a convolution theorem are provided and well involved in establishing certain spaces of Boehmians for the generalized Natural transform operator. Two continuous embeddings of the space of integrable functions into the space of Boehmians are introduced. In relation to the generalized Natural transform operator and its inversion formula, various properties of the pair of integrals are obtained.

# On the coefficient of the nth Cesaro mean of order of Biunivalent functions

Adnan Gzhay AlAmoush[1] and Mohammad Al-Kaseasbeh[2]
[1]Faculty of Science, Taibah University, Saudi Arabia.
[2]Department of Mathematics, Faculty of Science, Jerash University, Jerash, Jordan
zakariya.alkaseasbeh@gmail.com,

## Abstract

The purpose of the present paper is to introduce a new subclasses of the function class of bi-univalent functions defined in the open unit disc. Furthermore, we obtain estimates on the coefficients $|a_2|$ and $|a_3|$ for functions of this class. Some results related to this work will be briefly indicated.

# On generalized $p$−valent non-bazilevi˘c functions of order $\alpha + i\beta$

A.A. Amourah, A. G. Alamoush and M. Darus

## Abstract

In this paper, we introduce a subclass $N_{p,\mu}^{n}(\alpha,\beta,A,B)$ of $p$-valent non-Bazilevi˘$c$ functions of order $\alpha + i\beta$ .Some subordination relations and the inequality properties of $p$−valent functions are discussed. The results presented here generalize and improve some known results.

# Role of inertial forces in peristaltic flow of micropolar fluid through porous-saturated tube under the inducement of magnetic field: a numerical study

Bilal Ahmed, Tariq Javed and M. Sajid
Department of Mathematics and Statistics,
International Islamic University Islamabad, 44000, Pakistan.
bilalmaths7@yahoo.com

## Abstract

In this investigation, modeling and simulation of peristaltic flow of non-Newtonian micropolar fluid passing through tube filed with uniform porous medium under the inducement of the magnetic field are presented. In modeling of governing equations, the long wavelength along with low Reynolds number assumptions are not incorporated which dost not vanishes the effect of inertial forces and allows to present the results that are valid for moderate Reynolds number and non-zero wave number. As a result, the governing equations turns to a system of nonlinear coupled partial differential equations. Galerkin weighted residual finite element method is implemented to compute numerical results of modeled nonlinear coupled partial differential equations. The obtained results are presented by plotting longitudinal velocity, pressure rise per wavelength and contours of streamlines, vorticity along with microrotation in graphs for suitable ranges of the participated parameters and discussed in detail. Validation of present formulation and simulation is made by comparing the obtained results with that of available results in the literature which is found in good agreement. It is observed that peristaltic mixing is supported by Reynolds number and permeability parameter of porous medium while Hartmann number reduces the number and size of the bolus. Pressure rise per wavelength is found greater in non-Newtonian micropolar fluid as compared to that of Newtonian fluid.

**Keywords:** Micropolar Fluid; Peristaltic Flow; Porous-Saturated Tube; MHD; Finite Element Method.

# Restriction the derivate norm and fractional Order analytic functions

G.Gaimnazarov
Gulistan state University, Sirdarya region,Gulistan City, Uzbekistan
e-mail:g_olimjon@mail.ru

## Abstract

Let us denote Hp by the set of analytic functions in the unit circle. Such kind of spaces are called Hardee Hp .For $0 < p < 1$ on spaces Hp for periodic functions E.A.Storozhenko created Jackson types of theorem and S.N.Bernstein, S.M.Nicolsky types of inequalities. We studied integer and fractional order of derivative spaces on $Lp(-\infty, \infty)$.In our researches. In this work we will see the restriction norm of integer and fractional order of derivative of analytic functions on spaces $Hp$ $(0 < p < \infty)$.

**Keywords:** Analytic functions, fractional order of derivative(differensial), norm,restriction, Jackson, Hardee, S.N.Bernstein.

# Analytical solution of neutron diffusion equation in reflected reactors using modified differential transform method

***Mohammed Shqair*1 and Essam R. El-Zahar2,3***

*1Physics Department, Faculty of Science and Humanities, Prince Sattam bin Abdulaziz University, Al-kharj, Saudi Arabia*
*2Mathematics Department, Faculty of Science and Humanities, Prince Sattam bin Abdulaziz University, Al-kharj, Saudi Arabia*
*3Department of Basic Engineering Science, Faculty of Engineering, Shebin El-Kom, 32511, Menofia University, Egypt.*
** 00966596498633,shqeeeer@gmail.com*

## Abstract

In this paper, analytical solution of neutron diffusion equation in reflected reactors is obtained using Modified Differential Transform Method (MDTM). The MDTM is applied successfully on singular and non-singular initial value problems arising for the essential reactor's geometries. Here, the reactors will not only consist of fuel part (bare reactors), but also it has core and reflected parts (reflected reactors). A comparison with results in literature and transport theory data is presented. The results confirm that the MDTM is effective and reliable in solving the considered problem.

# Solving logistic equation of fractional order using the reproducing kernel Hilbert space method

Shatha Hasan[1], Mohammed Alabedalhadi[1], Rania Saadeh[2], Asad Freihet[1], Mohammad Al-Smadi[1] and Shaher Momani[3,4]

[1]Department of Applied Science, Ajloun College, Al-Balqa Applied University, Ajloun ,Jordan

[2]Department of Mathematics, Faculty of Science, Zarqa University, Zarqa 13110, Jordan

[3]Department of Mathematics, Faculty of Science, The University of Jordan, Amman, Jordan

[4]Nonlinear Analysis and Applied Mathematics (NAAM) Research Group, Faculty of Science, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia

## Abstract

In this talk, we introduce the audience to the ideas that led to several improvements of celebrated inequalities in functional analysis. In particular, we clarify the role of convexity behind these inequalities; where convex functions seem to be a key tool for obtaining such inequalities. Once the scalar inequalities are clarified, we guide the audience on how to obtain operator inequalities from simple scalar inequalities.

**Keywords**: Fractional Logistic Equation, Riemann-Liouville Fractional Integral, Caputo Fractional Derivative, Reproducing Kernel Hilbert Space.

# An application of Taylor series method in higher dimensional fractal spaces

Ruwa Abdel Muhsen
Department of Mathematics & Statistics, Jordan University of Science and Technology,
P.O.Box 3030, Irbid 22110, Jordan.
E-mail: rmabedalmohssen17@sci.just.edu.jo

## Abstract

The aim of this work is to extend the Taylor series method to higher dimensional fractal spaces. An analytical solution of higher dimensional fractional differential equations is provided with different fractal-memory indices in time and space coordinates simultaneously. To show the effectiveness of the proposed method, the method has been applied to three presented models in fractal 2D and 3D spaces. The attained closed-form series solutions are in a high agreement with the exact solutions for the corresponding equations when they projected into the integer space.

**Keywords**: Fractional partial differential equations; Taylor series method; Memory index

# Characterizing when the powers of a tree, are divisor graphs

Eman A. AbuHijleh1
Department of Basic Sciences, Al-Balqa Applied University,
Al-zarqa University College, Jordan
E-mail: emanhijleh@bau.edu*

## Abstract

A full characterization of $T^k$ with $k = 2, 3, 4$, if it is a divisor graph, was given by $E$. AbuHijleh et. Al. Moreover, same authore gave a characterization if $T^k$ is not a divisor graph, for any positive integer $k \geq 2$. In this paper, we give a full characterization of $T^k$ with positive integer $k \geq 5$, if it is a divisor graph.

**Keywords:** Tree; divisor graph; power of a graph.

# Particles' collisions in some special versions of the Boltzmann equation

**Roksana Brodnicka[1], Henryk Gacki[2]**

Adnan Gzhay AlAmoush[1] and Mohammad Al-Kaseasbeh[2]
[1]Faculty of Science, Taibah University, Saudi Arabia.
[2]Department of Mathematics, Faculty of Science, Jerash University, Jerash, Jordan
zakariya.alkaseasbeh@gmail.com,

## Abstract

The purpose of the present paper is to introduce a new subclasses of the function class of bi-univalent functions defined in the open unit disc. Furthermore, we obtain estimates on the coefficients $|a_2|$ and $|a_3|$ for functions of this class. Some results related to this work will be briefly indicated.

# Particles' collisions in some special versions of the Boltzmann equation

Roksana Brodnicka[1], Henryk Gacki[2]
[1]University of Silesia in Katowice
[2]University of Silesia in Katowice
Institute of Mathematics tel. +48 32 258 29 76, rbrodnicka@o2.pl

## Abstract

We present a sufficient condition for the asymptotic stability with respect to total variation norm of semigroup generated by an abstract evolutionary nonlinear Boltzmann-type equation in the space of signed measures with the right hand side being a collision operator. We use a sufficient condition for the asymptotic stability of Markov semigroups acting on the space of signed measuresfor any distance, adapted to the total variation norm, joined with the maximum principle for this norm. Differential equations for functions with values in the space of signed measures can be used to solve some problems of mathematical physics. According to Barnsley and Cornille we considered so-called the Tjon-Wu equation.

# Soliton Solutions of Ion Acoustic Waves in Plasma

Hind Al-douri and Gharib Gharib
Mathematics Department, College of Science, Zarqa University, Jordan
E-mail: hindgh503@gmail.com
E-mail: ggharib@zu.edu.jo

## Abstract

The Korteweg-de Vries (KdV) equation have been derived, and analytically examined. The basic features of KdV solitons have been analyzed, and in this paper used a numerical technique based on Sine method, is developed to solve. Some illustrative examples are presented and the obtained results reveal that the proposed technique is very effective and accurate. It has been observed that the degenerate plasma system under consideration supports the propagation of solitons obtained from the solutions of KdV equation.

# On the Weighted Mixed Almost Unbiased Liu Type Estimator

Mustafa I.Alheety
Department of Mathematics
University Of Anbar
Ramadi, Iraq
Email: alheety@yahoo.com

## Abstract

We present a sufficient condition for the asymptotic stability with respect to total variation norm of semigroup generated by an abstract evolutionary nonlinear Boltzmann-type equation in the space of signed measures with the right hand side being a collision operator. We use a sufficient condition for the asymptotic stability of Markov semigroups acting on the space of signed measuresfor any distance, adapted to the total variation norm, joined with the maximum principle for this norm. Differential equations for functions with values in the space of signed measures can be used to solve some problems of mathematical physics. According to Barnsley and Cornille we considered so-called the Tjon-Wu equation.

**Keywords:** mixed model; Stochastic linear restrictions

# Integration of periodic functions

Boborakhimova Makhbuba Ikhiyorovna
Department of Higher mathematics, Bukhara Technological Institute of Engineering,
Uzbekistan, Bukhara
kamina9314@mail.ru

## Abstract

This topic focuses primarily on the approximate integration of periodic functions. The accuracy of the quadrature formula is then compared to the trigonometric polynomial, not the algebraic polynomial.