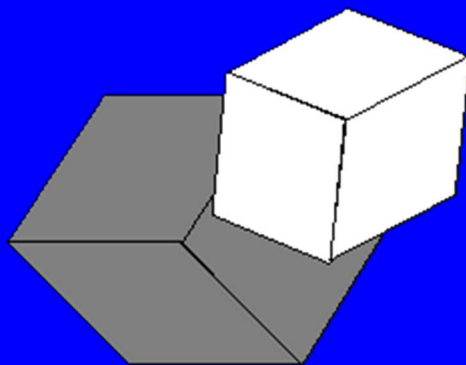# Italian Journal of Pure and Applied Mathematics

Papers Abstracts

Approximate approach for solving two points fuzzy boundary value problems

N. R. Anakira, A. F. Jameel, A. K. Alomari, A Saaban, M. A. Shakhatreh and A. Odat

In this paper the Homotopy Perturbation Method (HPM) is employed to solve n'thorder ($n \geq 2$) non linear two point fuzzy boundary value problems (TPFBVP). The homotopy perturbation method can be used for solving n'th order fuzzy differential equations directly without reduction to first order system. The convergence theorem of this method in fuzzy case is presented and proved. We illustrate the method in numerical experiment including second order linear TPFBVP to show the accuracy and capabilities of HPM.

(pp. 1–17)

On the sum of element orders of $\mathrm{PSL}(2, p)$ for some p

Morteza Baniasad Azad and Behrooz Khosravi

Let G be a finite group and $\psi(G) = \sum_{g \in G} o(g)$, where $o(g)$ denotes the order of $g \in G$. In this paper, we show that if G is a group of order $|\mathrm{PSL}(2, p)|$, then $\psi(G) \geq \psi(\mathrm{PSL}(2, p))$, where $p \in \{11, 13, 19, 23, 29, 37, 61\}$. Also we prove that $|G| = |\mathrm{PSL}(2, p)|$ and $\psi(G) = \psi(\mathrm{PSL}(2, p))$ if and only if $G \cong \mathrm{PSL}(2, p)$, where $p \in \{11, 13, 19, 23, 29, 37, 61\}$. Furthermore, we prove that $\mathrm{PSL}(2, 17)$ is determined by its order and the sum of element orders.

(pp. 18–24)

The non-coprime graph of a finite group with respect to a subgroup

Gholamreza Aghababaei-Beni, Ali Reza Ashrafi and Abbas Jafarzadeh

The non-coprime graph $\Pi_{G,H}$ of a finite group G with respect to a subgroup H is a simple graph with $G \setminus \{e\}$ as the vertex set. Two vertices u and v of this graph are adjacent if and only if $(|u|, |v|) \neq 1$ and ($u \in H$ or $v \in H$). In this paper, the main properties of this graph are obtained. The isomorphism problem of this graph is also investigated for nilpotent groups.

(pp. 25–35)

Some fixed soft point theorems on a new soft topology related to a self soft mapping

İzzettin Demir and Resime Bozyikit

In the present paper, we introduce a new soft topology related to a self soft mapping and study its some basic properties. Also, we give the notion of a soft orbit and support it with examples. Moreover, we present the notion of a soft b-metric space, which is a soft version of b-metric space of Czerwik [7]. Next, by using these notions, we establish some fixed soft point theorems, which are the main results of our paper.

Semi-symmetry properties of the tangent bundle with a pseudo-Riemannian metric

Aydin Gezer and Cagri Karaman

In this note, we consider the tangent bundle TM equipped with a pseudo-Riemannian metric $\widetilde{g}$ over a Riemannian manifold (M, g). We investigate semi-symmetry properties of the tangent bundle TM with respect to the Levi-Civita connection $\widetilde{\nabla}$ and a metric connecton $\widehat{\nabla}$ with torsion.

Absolutely self pure modules

Mohanad Farhan Hamid

An R-module M is called absolutely self pure if for any finitely generated left ideal L of R, any map from L into M, whose kernel is in the filter generated by the set of all annihilator ideals $\mathrm{ann}(m)$ of elements m in M, is a restriction of a map from the ring R into M. Certain properties of quasi injective and absolutely pure modules are extended to absolute self-purity. Regular, left noetherian, left semihereditary and Prüfer rings are characterized using this concept, for example, a ring R is left noetherian if and only if every absolutely self pure R-module is quasi injective and R is regular if and only if every R-module is absolutely self pure.

Cryptographic study of functional message using two chaotic models

Berguellah Nourelhouda and Hamri Nasr-Eddine

In this paper we present two chaotic models used for secure transmission of a functional message which is the function $\sin \omega t$, without forgetting the role of synchronization mechanisms of chaotic systems to the success of these transmissions.

A note on bisections of graphs with girth at least 6

Jing Lin

A *bisection* of a graph is a partition of its vertex set into two sets which differ in size by at most 1, and its *size* is the number of edges between the two sets. Let G be a graph with m edges, perfect matchings and girth at least 6. Let $d_1, d_2, \ldots, d_n$ be vertex degrees, then there is a constant $c > 0$ such that G admits a bisection of size at least $m/2 + c \sum_{i=1}^{n} \sqrt{d_i}$. It follows as a corollary that G has a bisection of size at least $m/2 + cm^{3/4}$.

Common fixed point theorems for generalized contraction conditions involving rational expressions in complex valued metric spaces

M. V. R. Kameswari

The aim of this paper is to prove common fixed point theorems for a pair of self maps satisfying general contraction conditions involving rational expressions having a point dependent control functions as coefficients in complex valued metric spaces. Our results extend and generalize the results of Nashine et.al., [5] and some known results in the literature. To show validity of our results some illustrative examples are also furnished.

An iterative solution for a class of optimization problems

Maawiya Ould Sidi and Rabie Zine

In this paper, we will describe an iterative approximation method to approach the optimal solution of a linear programming problem by providing an algorithm for resolution with an analysis of its convergence and its complexity.

Some fixed point theorems in complex valued b-metric spaces

Aiman A. Mukheimer

We introduce the notion of fixed points for a mappings in complex valued b-metric space and demonstrate the existence and uniqueness of the main Banach contractive type, Kannan type, and Chatterjea type in complex valued b-metric spaces. Presented theorems in this paper extend and generalize the results derived by Mehmet and Kiziltunc in [12]. Some examples are given to illustrate the main results.

Fuzzy H_v-semigroups

N. Jahanshahi-Nukandeh, Y. Talebi and M. Asghari-Larimi

In this paper, we introduce the notion of fuzzy H_v-semigroups, fuzzy H_v-groups and fuzzy H_v-homomorphisms and establish connections between fuzzy H_v-semigroups and H_v-semigroups. Also, we define and analyze the concept of fuzzy (strong) hypercongruences on fuzzy H_v-semigroups.

Derivations of rings and Banach algebras

Mohd Arif Raza, Mohammad Shadab Khan and Nadeem Ur Rehman

We investigate the action of derivation d in a prime ring and semiprime ring R with center $Z(R)$ satisfying (i) $(d(x \circ y))^m - (x \circ y)^n \in Z(R)$ (ii) $(d(x) \circ d(y))^m = (x \circ y)^n$ for all $x, y \in I$, a nonzero ideal of R. Finally, as an application we apply our results to the continuous derivations on Banach algebras.

Coefficient estimates for a subclass of analytic functions using Faber polynomials

G. Saravanan and K. Muthunagai

In this paper, we introduce and investigate a new subclass $Q_\Sigma^{**}(\alpha, \phi)$ of normalized analytic functions defined using convolution in the open unit disk U whose inverse has univalent analytic continuation to U. Estimates of the coefficients of bi-univalent functions belonging to this class are determined by using Faber polynomial techniques.

Schur convexity of generalized geometric Bonferroni mean involving three parameters

Shan-He Wu, Huan-Nan Shi and Dong-Sheng Wang

In this paper, we discuss the Schur convexity, Schur geometric convexity and Schur harmonic convexity of the generalized geometric Bonferroni mean. At the end of the paper, two inequalities related to the generalized geometric Bonferroni mean are established to illustrate the applications of the obtained results.

On TL-fuzzy ideals and their L-fuzzy roughness in lattices

Yi Jun Li and Jun Tao Wang

In this paper, we study TL-fuzzy ideals of lattices. First, using a left continuous t-norm T on a complete lattice L, we introduce the concept of TL-fuzzy ideals of lattices and study the corresponding relations between TL-fuzzy ideals of two homomorphic lattices and discuss the image and the inverse image of generated TL-fuzzy ideals. Moreover, we consider the L-fuzzy roughness in lattices based on a complete residuated lattice, which is a generalization of (fuzzy) roughness in lattices. And we study some related properties of TL-fuzzy ideals with respect to T-upper and θ-lower fuzzy rough approximations.

A criterion of p-nilpotency of finite groups with some weakly s-semipermutable subgroups

Xinjian Zhang and Yong Xu

Let H be a subgroup of a group G. H is called a weakly s-semipermutable subgroup of G if there are a subnormal subgroup T of G and an s-semipermutable subgroup H_{ssG} in G contained in H such that $G = HT$ and $H \cap T \leq H_{ssG}$. In this paper, we got a criterion of p-nilpotency of G by some weakly s-semipermutable subgroups.

Co-small monoform modules

Muna Abbas Ahmed

The concept of small monoform module was introduced by Hadi and Marhun, where a module U is called small monoform if for each non-zero submodule V of U and for every non-zero homomorphism $f \in Hom_R(V, U)$, implies that ker f is small submodule of V. In this paper the author dualizes this concept; she calls it co-small monoform module. Many fundamental properties of co-small monoform module are given. Partial characterization of co-small monoform module is established. Also, the author dualizes the concept of small quasi-Dedekind modules which given by Hadi and Ghawi. She show that co-small monoform is contained properly in the class of the dual of small quasi-Dedekind modules. Furthermore, some subclasses of co-small monoform are investigated. Other generalizations of co-small monoform are introduced.

(pp. 230–241)

$p - [a, b]$-paracompactness in bitopological spaces

Fuad A. Abushaheen and Hasan Z. Hdeib

In this paper, we introduce a new definition of paracompactness in bitopological spaces, we give a equivalent statements for this notation. Finally a product theorem is given.

(pp. 242–250)

Hydrodynamic lubrication of a porous slider: shuns simplifying assumption of a small porous facing thickness

J.V. Adeshara, M.B. Prajapati, G.M. Deheri and R.M. Patel

This investigation analyzes the lubricating characteristics of a ferrofluid based plane porous slider without the use of the simplifying assumption of a small porous facing thickness. The magnetic fluid flow model of Neuringer and Rosensweig has been adopted here. It is observed that the performance characteristics getting improved owing to magnetization of the lubricant. Further, significant deviations from the past results are observed regarding the ranges of some parameters for which the simplifying assumption yield that satisfactory results.

(pp. 251–261)

An algorithm to compute the number of Rosenberg hypergroups of order less than 7

H. Aghabozorgi, M. Jafarpour, M. Dolatabadi and I. Cristea

Using some special type of Boolean matrices, named very good matrices, we enumerate the non-isomorphic Rosenberg hypergroups of order less than 7. Moreover, the regular and reversible Rosenberg hypergroups are identified. Also the algorithm behind the method is presented.

Certain notions of single-valued neutrosophic K-algebras

Muhammad Akram, Hina Gulzar and K.P. Shum

We apply the notion of single-valued neutrosophic sets to K-algebras. We develop the concept of single-valued neutrosophic K-subalgebras, and present some of their properties. Moreover, we study the behavior of single-valued neutrosophic K-subalgebras under homomorphism. Finally, we discuss $(\in, \in \vee q)$-single-valued neutrosophic K-algebras.

On hyperconnected spaces via m-structures

Hanan Al-Saadi, Ahmad Al-Omari and Takashi Noiri

In this paper, we introduce and investigate the notion of m-hyperconnectedness in a topological space (X, τ) with a minimal structure m_X on X. Several characterizations and preservation theorems of m-hyperconnectedness are obtained.

A review on empirical mode decomposition in forecasting time series

Ahmad M. Awajan, Mohd Tahir Ismail and S. Al Wadi

This study aims to survey and summarize the studies that introduced forecasting time series method based on EMD, providing references for researchers relating to this topic. We highlight results that have published during $1998 - 2017$ (since presented the EMD technique). In this survey, we also present some studies that improved EMD methodology to overcome its limitations. In this survey, we present some studies that improved EMD methodology to overcome its limitations, as well studies that have introduced an expansion of EMD

methodology. There has been tremendous progress in many areas, but we find that there are a large number of topics that need to be further developed. Finally, we summary some remarks may it will help the researcher in this area.

On the Diophantine equation $X^4 + hY^3 = Z^4 + hW^3$

S. D. Alavi, A. S. Janfada and A. Abbaspour

First we prove that, under a certain condition, the Diophantine equation $X^4 + hY^3 = Z^4 + hW^3$, where h is a rational number, has infinitely many nontrivial integral solutions. Using this result we deduce that, under a condition, for $k \geq 2$, the Diophantine equation $X^4 + Y_1^3 + Y_2^3 + \cdots + Y_k^3 = Z^4 + W_1^3 + W_2^3 + \cdots + W_k^3$ has infinitely many nontrivial integral solutions. Then, we conjecture, by some evidences, that the above conditions may be removed.

Fuzzy congestion in data envelopment analysis

Farhad Hosseinzadeh Lotfi and Alireza Hajihosseini

Congestion is an important aspect of economic concepts and data envelopment analysis (DEA) such that in recent years, special attention has been for mathematicians. Several models and methods have been proposed for measuring congestion in non-deterministic environment which cannot show inexact congestion. More important, the congestion is less been investigated with imprecise data which a comprehensive model has not been presented yet. In this paper, our aim is to introduce extension of measuring congestion in DEA with common set of weights and fuzzy inputs and outputs such that, comparisons in models are fuzzy. Finally the proposed models for fuzzy congestion will be shown by examples.

On asymptotically lacunary statistical equivalent (Wijsman sense) set sequences via ideal and modulus function

Wadei Al-Omeri

For any non-trivial ideal $\mathcal{I} \subseteq \wp(\mathbb{N})$, and any non-empty closed subset $A_k \subseteq X$, where (X, ρ) is a metric space. Let f be a modulus function, The objective of this paper is to introduce and study the new notation by using a modulus function, $\mathcal{I}(W_L)$, $\mathcal{I}(fW)$, $\mathcal{I}[WN]_\theta^L$, $\mathcal{I}(Wf^L)$, $\mathcal{I}(_\theta^W f)$, $\mathcal{I}(WS^L)$ and $\mathcal{I}(WS_\theta^L)$. Which are natural combinations of the definitions for asymptotically lacunary

equivalent (*Wijsman sense*). In addition, some relations among these new notions are also obtained.

New types of soft ordered mappings via soft α-open sets

T. M. Al-Shami, M. E. El-Shafei and M. Abo-Elhamayel

The concept of soft topological ordered spaces is an extension of the soft topological spaces notion. The motivation of this paper is twofold: One is to generalize and extend the existing ordered maps and other is to contribute on making a general framework for studying soft topological ordered spaces. In this study, we utilize soft α-open sets to introduce new ordered maps, which generalize existing comparable notions, namely soft $x\alpha$-continuous, soft $x\alpha$-open, soft $x\alpha$-closed and soft $x\alpha$-homeomorphism maps, for $x \in \{I, D, B\}$, via soft topological ordered spaces. We show the relationships among these concepts and discuss the equivalent conditions for each one of them. Also, we derive that an extended soft topologies notion guarantees the equivalent between the soft maps initiated herein and their counterparts of maps on topological ordered spaces. For illustration and comparison, various examples are provided.

Forecasting earnings of firm's listed in ASE using ARIMA model

O. Alsinglawi, S. Al Wadi, M. Aladwan and B. Bouqaleh

The study aims to estimate and forecast earnings of the firms listed in Amman Stock exchange (ASE) using a time series data of earning per share (EPS) for the period from 1978 till 2016. The data has been extracted from firms' annual reports. A wavelet Transform (WT) decomposes the data and detects the fluctuations and outlay values. The parameters p, d, and q are estimated using the ARIMA model, the results show that the ARIMA models accuracy criteria MASE and RSME have the lowest values (0.7089 and 0.0709) respectively, thus the forecasting accuracy is high. It is concluded that firms' earnings show slow increasing trend for the upcoming 38 financial years.

Rough set theory applied to UP-algebras

Moin Akhtar Ansari, Ali N.A. Koam and Azeem Haider

In this paper, the concept of roughness in UP-algebras is introduced. We study the lower and upper approximations of UP-subalgebras and UP-ideals and prove that the lower/upper approximation of UP-subalgebra (resp., UP-ideals) is a UP-subalgebra (resp., UP-ideals). A connection between rough sets and UP-Algebras with their weak and strong ideals have also been taken under consideration and some related results have been shown.

Some separation axioms using hereditary classes in generalized topological spaces

Rajni Bala

We introduce a new class of generalized topological spaces namely T_2 modulo $\mathcal{H}$ and discuss its various properties and characterizations. Also we define $\mathcal{H}$-regular generalized topological spaces and study some properties of the same.

Edge maximal non-bipartite Hamiltonian graphs without theta graphs of order 7

M.S. Bataineh, A.A. Al-Rhayyel, Zead Mustafa and M.M.M. Jaradat

For a set of graphs $\mathcal{F}$, let $\mathcal{H}(n; \mathcal{F})$ denote the class of non-bipartite Hamiltonian graphs on n vertices that does not contain any graph of $\mathcal{F}$ as a subgraph and $h(n; \mathcal{F}) = \max\{\mathcal{E}(G) : G \in \mathcal{H}(n; \mathcal{F})\}$ where $\mathcal{E}(G)$ is the number of edges in G. In this paper, we determine $h(n; \{\theta_4, \theta_5, \theta_7\})$ and we establish an upper bound of $h(n; \theta_7)$ for sufficiently even large n. Our results confirms the conjecture made in [1] for $k = 3$.

Some Drazin invertible elements in Banach algebras and applications to operator equations solutions

Ehfouda Belhadi, Abdelouahab Mansour and Abdelouahab Salmi

In this paper, some conditions of Drazin invertibility of operators has been established as well as some results for operations on Drazin invertible operators leading to the solvability of some oparator equations in Banch algebras.

Recognizable iso-triangular picture languages

K. Bhuvaneswari and T. Kalyani

In modern civilization, the art of tiling has become a Prerogative pattern. Tiling patterns have been used to decorate and cover floors and walls. Motivated by the problem of tiling, H. Wang introduced a tile in 1961, called by his name, Wang tile and in which the edges are coloured. A finite set of Wang tiles admits a valid tiling of the plane if copies of tiles can be arranged one by one without rotation or reflection to fill the plane so that gluable tiles which have the same colour. Wang tiling patterns motivate Kalyani et.al to introduce an iso-triangular labelled Wang tiles. A finite automaton is one of the machines that scan the pictures and recognizes the pictures. In this paper, we define iso-triangular Wang automaton and iso-triangular Wang P system. It is showed that an iso-triangular Wang automaton stimulates the computational power of the P system. The iso-triangular Wang P system recognizes the iso-triangular pictures. The computational complexity of iso-triangular Wang automaton and iso-triangular Wang P system is examined with the computational powers of iso-triangular Wang system, iso-triangular tiling system and hexagonal tiling system.

Γ-convergence: an application to eigenvalue problems

Ibtissam Brahmi, Abdelouahed El Khalil and Abdelfattah Touzani

We apply an elementry result of $\Gamma-$convergence to show the dependance on $p(\cdot)$ of the first eigenvalue $\lambda_{p(x)}$ of the $p(x)-$Laplacian problem

$$\begin{cases} -\Delta_{p(x)}(u) = \lambda|u|^{p(x)-2}u, & \text{in } \Omega, \\ u = 0, & \text{on } \partial\Omega. \end{cases}$$

On connectedness of the Hausdorff fuzzy metric spaces

Changqing Li and Yanlan Zhang

Several properties of the Hausdorff fuzzy metric, as completeness, precompactness and completion were discussed by Rodríguez-López and Romaguera [The Hausdorff fuzzy metric on compact sets, Fuzzy Sets and Systems 147 (2004) 273–283]. It is necessary to seek other more properties of the Hausdorff fuzzy metric. In the paper, we show that a fuzzy metric space is connected if and only if the corresponding Hausdorff fuzzy metric space on compact (finite) sets is connected.

A new criterion of optimization of the cross multipole coefficients in a modified surface stress operator for the elastic two-dimensional case

Youcef Djenaihi and Belkacem Sahli

The question of non-uniqueness in the integral formulation of an exterior boundary value problem in the elastic two-dimensional case has been resolved using the modified' Green's function technique. In this work, a new criterion of optimality based on the minimization of the norm of the surface stress operator (modified traction operator) is established.

On certain properties of hyperbolically convex functions

Nashat Faried, Mohamed S. S. Ali and Zeinab M. Yehia

The aim of this paper is to prove that the envelope of hyperbolically convex functions is hyperbolically convex function. Furthermore, we study the standard functional operations of hyperbolically convex functions and introduce a class $BH[a,b]$ of functions representable as the difference of two hyperbolically convex functions.

Fuzzy order relative to fuzzy B-algebras

N.C. Gonzaga, Jr. and J.P. Vilela

Let $(X; *, 0)$ be a B-algebra and μ a fuzzy B-algebra defined on X. For each $x \in X$, the fuzzy order of x, denoted by $FO_\mu^B(x)$, is the least positive integer n such that $\mu(x^n) = \mu(0)$. Also, the order of an element $x \in X$, denoted by $|x|_B$, is the least positive integer n such that $x^n = 0$. In this paper, some properties of $FO_\mu^B(x)$ are established. Also, the relationship between $FO_\mu^B(x)$ and the order $|x|_B$ of x is also explored.

On counting by a pair of Fibonacci generated countable sets of irrationals

Nassar H.S. Haidar

A Fibonacci sequence representation of any rational number of the real line R is used to construct a pair of phi-nary (in relation to the Golden ratio φ)unique countable sets of irrational numbers. These sets, which have a potential for novel applications, are further employed in the proof that R should be populated "much more with irrational numbers than with rational numbers".

A modified quasi-Newton methods for unconstrained optimization

Basim A. Hassan

In this paper, we present a new modified SR1 method based on the new quasi-Newton equation. Under some suitable condition, we prove the global convergence of method with Wolfe condition. The Numerical results show that the proposed method effective for the given some test problems.

<div align="right">(pp. 504–511)</div>

On some weak structures in intuitionistic fuzzy soft topological spaces

Sabir Hussain

Intuitionistic fuzzy set is fruitful and more realistic model of uncertainty than the fuzzy sets. Extending this approach further, intuitionistic fuzzy soft sets were introduced, as a generalization of fuzzy soft sets and standard soft sets. Intuitionistic fuzzy soft sets used to handle the problem of muti-criteria decision making. In this paper, We initiate and establish the topological structures of intuitionistic fuzzy soft semi-open sets and intuitionistic fuzzy soft semi-closed sets. We also define and explore the properties of intuitionistic fuzzy soft semi-interior, intuitionistic fuzzy soft semi-closure and discuss the relationship between them. Moreover, we establish and discuss intuitionistic fuzzy soft semi-open neighborhood systems. We believe that the findings in this paper will enhance the further study proceed towards muti-criteria decision making problems.

<div align="right">(pp. 512–525)</div>

On fuzzy soft compact and fuzzy soft locally compact spaces

Sabir Hussain

In this paper, we define and explore the properties and characterization of fuzzy soft compact spaces at fuzzy soft point. We also initiate and investigate the concept of fuzzy soft locally compact spaces at fuzzy soft point through its properties and characterization. Examples of defined notions are also presented to validate their existence. We hope that the obtained results will proceed towards more natural findings and applications in real life problems with the issues of uncertainties and ambiguous environment.

<div align="right">(pp. 526–538)</div>

Fuzzy sets in fully UP-semigroups

Akarachai Satirad and Aiyared Iampan

In this paper, we introduce several types of subsets and of fuzzy sets of fully UP-semigroups, and investigate the algebraic properties of fuzzy sets under the operations of intersection and union. Further, we discuss the relation between t-characteristic fuzzy sets and UP$_s$-subalgebras (resp., UP$_i$-subalgebras, UP$_s$-filters, UP$_i$-filters, UP$_s$-ideals, UP$_i$-ideals, strongly UP$_s$-ideals and strongly UP$_i$-ideals).

(pp. 539–558)

Effect of thermal diffusion and chemical reaction on MHD free convective flow past an infinite isothermal vertical plate with heat source

S.H. Islam and N. Ahmed

An attempt has been made to study the heat and mass transfer effect on an MHD free convection flow of an electrically conducting viscous fluid past over a moving infinite isothermal vertical plate subject to transverse magnetic field in presence of Soret effect, chemical reaction, heat source and thermal radiation. Exact solutions for velocity field, temperature profile and concentration distribution are obtained using Laplace transformation technique in closed form. Expressions for skin friction, rate of heat transfer and rate of mass transfer are also derived. The effects of different physical parameters on the various fields are studied graphically.

(pp. 559–574)

Use of data envelopment analysis for clustering of decision making units

Hassanali Jami and Sharad Gore

In this paper, clustering based on data envelopment analysis (DEA) of eight educational groups, with each group having four inputs and outputs, as well as DMU$_k$ ID, is specified. Minitab software and optimal weights for the formation of clusters of DMUs were used for the analysis. The statistical descriptions of DMUs showed, that the elementary educational group (DMU$_2$) with the best educational performance ranked first. The correlation between the variables of different DMUs was also investigated. In an analysis of the main variables, only three items of eigenvalue were greater than one. In clustering based on DMUs as highlighted in green, with the four clusters, more than 97% of variables could be retained. Based on observations as shown in red, considering the three clusters, more than 78% of information could be maintained and in this stage the abnormal variable of O_3 (scientific products) was removed from the process.

Regarding the analysis, the results of path coefficients showed that DMU$_2$ had seen the best economy performance.

Numerical solution of cubic free undamped Duffing oscillator equation using continuous implicit hybrid method

M. Motawi Khashan, Muhammed I. Syam and A.K. Alomari

In this paper, we investigate the solution of the cubic free undamped Duffing oscillator equation based on the implicit hybrid method. We investigate the consistency, zero stable, convergence, order, error constant, and region of absolute stability of the proposed method. In addition, we study the zero stability, the order, and the error constant of the block method which is generated from the proposed method. Numerical results are presented to show the efficiency of the proposed method.

Mixed monotone property and tripled fixed point theorems in partially ordered bipolar-metric spaces

G.N.V. Kishore, B. Srinuvasa Rao and R. Subba Rao

In this paper, we obtain the existence and unique tripled fixed point theorems by using weak contractivity type and mixed monotone type mapping in a Bipolar metric space endowed with partial order. Also, an example which supports our main result is given.

An automorphism theorem on certain type B semigroups

Chunhua Li, Limin Wang, Baogen Xu and Huawei Huang

Motivated by studying translational hulls in semigroups and rings, and also motivated M. Petrich and J. E. Ault's works in inverse semigroups in terms of translational hulls, we attempt in this article to study the idempotents of the translational hull of a type B semigroup. Our main result is to prove that the idempotent set of the translational hull of an arbitrary type B semigroup is isomorphic to the translational hull of the idempotent set of such a semigroup.

Some classes of pure sub-acts over semi-groups

Muna Jasim Mohammed Ali

In this paper the concepts of approximately pure subacts , approximately pure intersection subacts, and pure sub-acts relative to sub-acts have been studied. Some properties and some characterization of these notions are established and study approximately pure sub-acts with intersection property and pure sub-acts relative to sub-acts with intersection property.

(pp. 670–678)

On discrete time schemes for the problem of fibre suspension flows

J.M.W. Munganga

We present a time discrete stability results presented in [9], we use the tools presented in [3,6] to show that the results obtained in [9] can be generalized to obtain estimates not only for the velocity but also for the orientation tensor and a non zero body force, and without decomposing the orientation tensor into a sum of diagonal and a traceless tensors. As for the regular solutions, we prove the solutions of a discrete scheme are continuously dependent on the initial data and the same body force. Also, the restrictions imposed on the data con rm a well known result proven in [4, 8, 9], that for the rest state to be stable, the particle number Np must be less than 35/2.

(pp. 679–699)

A note on a finite group with all non-nilpotent maximal subgroups being normal

Na Li and Jiangtao Shi

In this paper we give an elementary proof to show that a finite group with all non-nilpotent maximal subgroups being normal is solvable.

(pp. 700–702)

Existence of tube solution for a fractional initial value problem

A. Neamaty and P.A. Kaffaei

In this paper, we show existence of tube solution (generalization of lower and upper solution) for a new initial value problem of a fractional nonlinear differential equation of order $0 < \alpha < 1$ with the conformable fractional derivative. By applying a variety of tools including the Schauder fixed-point theorem, some new existence results are achieved.

(pp. 703–714)

Upper and lower nearly (I, J)-continuous multifunctions

E. Rosas, C. Carpintero and J. Moreno

In this paper the authors introduce and study upper and lower nearly (I, J)-continuous multifunctions. Some characterizations and several properties concerning upper (lower) nearly (I, J)-continuous multifunctions are obtained. The results improves many results in Literature.

(pp. 756–765)

Generalization of T-small submodules

Sahira M. Yaseen

Let R be associative ring with identity and let M be unitary left R - module. A submodule N of M is called, T - small in M denoted by $N \ll_T M$, in case for any submodule $X \subseteq M$, $T \subseteq N + X$ implies that $T \subseteq X$ .In this paper ,we introduce the concept of GT - small submodule in M. A submodule N of an R-module M is called GT-small submoduleo in M, denoted by $N \ll_{GT} M$, in case for every essential submodule X of M, $T \subseteq N + X$ implies that $T \subseteq X$. We introduce and study the concepts GT-hollow module, GT-lifiting modules and GT-supplement submodules as a generalization of T-hollow module, T-lifiting moules and T-supplement submodules respectively we supply some examples and properties of these modules.

(pp. 766–774)

The elasticity of determinants life insurance demand in improving the efficiency of Jordanian life insurance companies

M.H. Saleh, J.J. Jaber, A.M. Rawashdeh and A.A. Al-Khawaldeh

The starting turbulent at any new century has brought numerous difficulties for firms and nations. During this period, success and survival analysis more and more depends on the efficiency which can be described by many different researching ways. The main target of this paper is to extend the earlier works on the elasticity of credit rate, the price of life insurance and product differentiation for improving efficiency in life insurer and increase the demand of life insurance policies. The paper strength is that the efficiency of life insurance companies is estimated from point of view of the insured. The result shows the inelastic life demand insurance, there are critical effects of credit rate, price, product differentiation on competition and efficiency in the targeted life insurance company. Moreover, there is a difficulty in understanding life insurance in Jordanian firms because they don't have the employees who are specialist in insurance. The ANOVA test and OLS are basically used in this study.

(pp. 775–787)

Blow up of solution for the Kelvin-Voigt type wave equation with Balakrishnan-Taylor damping and acoustic boundary

Toualbia Sarra and Abderrahmane Zara

The purpose of this work is to study the blow up of solutions in finite time, for a nonlinear equation of the kelving voigt type with balakrishnan taylor damping and acoustic boundary in a bounded domain in $\mathbb{R}^n$.

Unique fixed point results for pairs of mappings on complete metric spaces

Naveen Sharma, Naveen Mani and Naveen Gulati

In this article, we prove a coincidence point results for four pairs of mappings on four complete metric spaces. The obtained result generalize some well known fixed point results of literature such as Namdeo et al.[Thai Journal of Mathematics, 7(1) (2009), 129 – 135] and Gupta et al. [International Journal of Applied Physics and Mathematics, 2 (3), (2012), 169 – 171].

Generation of analytic semigroups by a pair of generalized mixed linear regular ordinary differential operators with interface condition

Ould Ahmed Mahmoud Sid Ahmed

In this paper, we establish with suitable assumptions the analyticity of semigroups generated by a pair of generalized mixed linear regular differential operators

$$L_{(n,n)}u(x) := \left(L_{1n}u_1(x), L_{2n}u_2(x)\right)$$
$$= \left(\sum_{0 \leq k \leq n} p_k(x)\left(\frac{d}{dx}\right)^k u_1(x), \sum_{0 \leq k \leq n} q_k(x)\left(\frac{d}{dx}\right)^k u_2(x)\right)$$

with involving an interface condition in the setting of complex Hilbert space $X = L^2([a,b]) \times L^2([b,c])$. We obtain quite general results that extend previous works by the authors ([3], [10]). The key for showing the generation analytic semigroups will be an inequality of the form

$$Re\langle \left(L_{(n,n)} - \rho I\right)u, \ u\rangle_X + \delta|Im\langle \left(L_{(n,n)} - \rho I\right)u, \ u\rangle_X| \leq 0, \forall u \in D(L_{(n,n)})$$

for some constant $\rho > 0$.

Geometric results of Han-Banach theorem for functionals on weak hypervector spaces

Ali Taghavi and Saeed Gholampoor

In this paper we prove some basic results of Han-Banach theorem for functionals on normed normal weak hypervector spaces.

(pp. 833–839)

Projective curvature tensor on generalized (k, μ)-space forms

Shanmukha B. and Venkatesha

In this paper, we study the projective curvature tensor on generalized (k, μ)-space forms. Here we study the projectively flat, ξ-projectively flat, pseudoprojectvely flat, h-projectively semisymmetric, ϕ-projectively semisymmetric, and $P \cdot S$ on generalized (k, μ)-space forms.

(pp. 840–850)

Characterizations of obstinate filters in semihoops

Jun Tao Wang, Ting Qian and Yan Hong She

In this paper, we consider fundamental properties of obstinate filters in semihoops and give some characterizations of them. Also, we discuss the relationship between obstinate filters and other types of filters (maximal, implicative, positive implicative, normal and fantastic filters) of semihoops and prove that a filter is an obstinate filter if and only if it is a maximal filter and positive implicative filter. Finally, we give some characterizations of simple semihoop by obstinate filter and prove that the homomorphic image of obstinate filters are also obstinate filters. These results will provide a more general algebraic foundation for inference rule in fuzzy logic based on left continuous t-norms.

(pp. 851–862)

Some subclasses of meromorphic multivalent functions involving a family of multiplier transforms

Zhi-Gang Wang and Xiao-Yuan Wang

Making use of the principle of subordination between analytic functions and a family of multiplier transforms defined on the space of meromorphic functions, we introduce and investigate some new subclasses of meromorphic multivalent

functions. Such results as inclusion relationships and integral-preserving properties associated with these subclasses are proved. Several subordination and superordination results involving this family of multiplier transforms are also investigated.

Some types of filters and states on hyper NM-algebras

Xiao Li Gao, Xiao Long Xin and Jian Ming Zhan

In this paper, we apply the hyper structures theory to NM-algebras and define the notion of hyper NM-algebras, which is a generalization of NM-algebras, and obtain some related results. We also state that any hyper NM-algebra is a hyper residuated lattice and the converse may not hold. Furthermore, we put forth some types of filters and deductive systems of hyper NM-algebras, such as (weak)h-filters, weak h-deductive systems and (positive) implicative weak h-deductive systems. Especially, we focus on discussing relationships of them. Finally, we give the definitions of sup-state, inf-state and hyper state on hyper NM-algebras and obtain there exists a hyper NM-algebra with sup-state and inf-state.

Improved reverses Young type inequalities

Xuesha Wu

The main purpose of this paper is to present new reverses Young type inequalities for numbers. Then, we use these inequalities to establish corresponding reverses Young type inequalities for operators.

Structure of finite groups with two real conjugacy class sizes

Yan Zhao, Changguo Shao and Qinhui Jiang

In this short note, we deteremine the structure of a finite group G satisfying $cs_r(G) = \{1, 2\}$, where $cs_r(G)$ denotes the set of real conjugacy class sizes of G.

On normalizers of Sylow subgroups and p-nilpotency of finite groups

Yong Xu and Xianhua Li

In this paper, we prove the p-nilpotency of a finite group under the assumption that some subgroups of Sylow subgroups are partial CAP-or c-supplemented in their normalizers. Our results unify and generalize some earlier results.

(pp. 907–915)

Derivations and differential filters on semihoops

Li Juan Zhang and Xiao Long Xin

In this paper, we introduce the notions of derivations and differential filters on semihoops and investigate some related properties of them. Also we discuss related properties of some particular derivations and give some characterizations of ideal derivations. Then we obtain that the set of all fixed points of a semihoop for an ideal idempotent derivation is a semihoop, the set of all fixed points of a $\vee$-hoop for an ideal derivation is an ideal. And for every non-trivial prime ideal I of a semihoop A, there exists a derivation d such that $Fix_d(A) = I$. Finally we find some relations between differential filters and other filters. It is proved that every maximal differential filter is a prime differential filter and the set of all differential filters of an ideal differential $\vee$-semihoop is a Heyting algebra.

(pp. 916–933)

Comparing study between simplex method and Lagrange method in a linear programming problem

A.A. Alsaraireh, M.S. Almasarweh, S. Al Wadi and M.B. Alnawaiseh

This study aims to discuss a different way to solve a linear programming problems. Two methods are discussed in this paper to determine a suitable method to solve these problems, and to determine which one is the easiest. We used : Simplex method and Lagrange method. Two methods were applied in general system to evaluate the result and compare between them. After that the researchers applying the numerical example to find the degree of readers satisfaction for these methods. The results of this study indicated that a two methods were a better, but the second method is easier than the first method.

(pp. 934–943)

Hybrid-based mathematical method for enhancing the quantitative research

M.S. Almasarweh, A.A. Alsaraireh, S. Al Wadi and M.B. Alnawaiseh

This study aims to discuss a special structure that can be exploited in the construction of efficient solution. The advantage of their methods usually has been the need to solve larger problems than otherwise would be possible to solve with computer technology. Two methods are discussed in this paper to determine a best method to solve these problems, and to determine which one is has a best result. We used : Network work method and Transportation problem method. Two methods were applied in general system to evaluate the result and compare between them. Also, the researcher discussed an example on a transportation problems. The results of this study indicated which one of the method has a simple steps in the solution.

(pp. 944–953)

Intellectual capital and effect on marketing performance an empirical study in Jordanian pharmaceutical industrial firms

M.S. Almasarweh, M.B. Alnawaiseh, A.A. Alsaraireh and S. Al Wadi

This study focuses on intellectual capital and its effect on marketing Performance through an economy based on knowledge. This study aims to determine the role of intellectual capital and its different dimensions (human capital ; structural capital and technological capital) in the company of our study. A questionnaire was developed to ensure the relationship between the independent and dependent variables (marketing Performance).

The hypotheses were tested using SPSS statistical software, the analyzes results to several outcomes including the existence of a statistically significant relationship between the intellectual capital and marketing Performance. One of the most important recommendations of the study is to increase attention to and management of intellectual capital, and it must be managed as an important source To achieve excellence, and the need to deal with intellectual capital as the most important strategic resource possessed by the company, and maintain the continuity of the active component in light of the tremendous technological development that the business environment.

(pp. 954–964)

Modeling the volatility insurance time series data using Wavelet transform

A.A. Alsaraireh, M.S. Almasarweh, S. Al Wadi and M.B. Alnawaiseh

Nowadays, the volatility of stock market data have contributed an essential section in risk study. Volatility is measured by standard deviation of the return. This study explores volatility event for the insurance time series data from Amman Stock Exchange (ASE). Wavelet models (WT) have used in order to study the events in the volatility data that collected from 2010 to 2018. Therefore, the researchers found that WT is a suitable model in studying the volatility data.