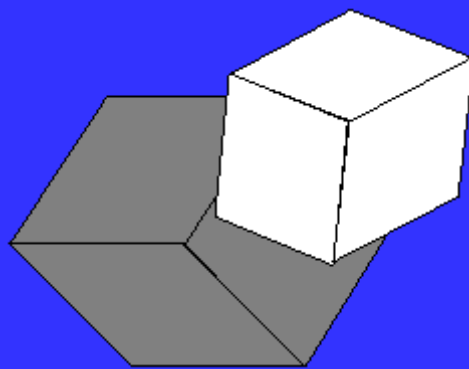


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## Papers Abstracts



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## ON HOLOMORPHICALLY DECOMPOSABLE FREDHOLM OPERATORS

Abdeslam El Bakkali, Abdelaziz Tajmouati

Let  $X$  be a complex Banach space and  $\mathcal{B}(X)$  the algebra of all bounded linear operators on  $X$ ,  $T$  is said decomposably Fredholm if there exists an Fredholm operator  $S$  such that  $TST = T$ .

In this paper we consider the subset  $\rho_{hF}(T)$  of  $\mathbb{C} : \mu_0 \in \rho_{hF}(T)$  if and only if there is a neighbourhood  $U_0$  of  $\mu_0$  and an analytic function  $W : U_0 \rightarrow \mathcal{B}(X)$  such that  $W(\lambda)$  is Fredholm and  $(T - \lambda I)W(\lambda)(T - \lambda I) = T - \lambda I$ . for all  $\lambda \in U_0$ , consequently we define a new spectrum  $\sigma_{hF}(T) = \mathbb{C} \setminus \rho_{hF}(T)$  said holomorphically decomposable Fredholm spectrum of  $T$ . We prove that  $\sigma_{hF}(T)$  is a non-empty compact subset of the classical spectrum  $\sigma(T)$ , and not satisfies the spectral mapping theorem.

(pp. 7-14)

## ON BINOMIAL OPERATOR REPRESENTATIONS OF SOME POLYNOMIALS

K.S. Nisar, Mumtaz Ahmad Khan

Based on the technique used by M.A. Khan and A.K. Shukla [2] here finite series representations of binomial partial differential operators have been used to establish operator representations of various polynomials not considered in the earlier mentioned paper. The results obtained are believed to be new. (pp. 15-20)

## ON THE EXTERNAL PATH LENGTH OF RANDOM RECURSIVE $k$ -ARY TREES

Mehri Javanian

In this paper, we determine the expectation and variance of  $X_n$  the external path length in a random recursive  $k$ -ary tree of size  $n$ .

(pp. 21-26)

## TERNARY SUPERRING

Yuming Feng, Baojie Zhang, Xiaoqian Song

We introduce a new algebraic system, which is called ternary semisuperring. A ternary semisuperring is a nonempty set with a binary hyperoperation's addition and a ternary hyperoperation's multiplication. It is a generalization of ternary semihyperring and semisuperring. We also introduce the notions of fuzzy superideal in ternary semisuperrings and give characterizations of fuzzy superideals.

(pp. 27-34)

## **SOME FIXED POINT THEOREMS FOR MULTIVALUED WEAKLY INCREASING OPERATORS**

Ishak Altun, Duran Turkoglu

In this paper, some common fixed point theorems for a pair of multivalued weakly increasing operators in partially ordered metric space and in partially ordered Banach space are proved. (pp. 35-42)

## **NON-FACTORIZABLE GROUPS**

M.R. Darafsheh, G.R. Rezaeezadeh, M.R. Dehghan Koruki

A group  $G$  is called a factorizable group if there are proper subgroups  $A$  and  $B$  of  $G$  such that  $G = AB$ . If  $G$  is non-trivial and no such a factorization exists  $G$  is called a non-factorizable group. In this paper we will show that if  $G$  is a non-factorizable group with Frattini subgroup as a minimal normal subgroup of order  $p^n$ , ( $1 \leq n \leq 5$ ), where  $p$  is a prime number, then  $G$  is a quasi-simple group. (pp. 43-48)

## **INFLUENCE OF MICROPOLAR PARAMETERS ON THE STABILITY DOMAIN IN A RAYLEIGH-BÉNARD CONVECTION PROBLEM – A RELIABLE NUMERICAL STUDY**

F.I. Dragomirescu, P.G. Siddheshwar, R.D. Ene

The main objective of this paper is the determination in the parameter space of the neutral hypersurface which separates the domain of stability from the instability domain in a problem of stationary convection in a micropolar fluid [1]. The influence of each of the micropolar parameters on the eigenparameter represented by the Rayleigh number is investigated using a spectral-Galerkin method based on expansion functions proved to assure an exponential convergence and small computational time expenses. (pp. 49-62)

## **ON THE SUBGROUPS OF TORSION-FREE GROUPS WHICH ARE SUBRINGS IN EVERY RING**

A.M. Aghdam, F. Karimi, A. Najafzadeh

In this paper we study the subgroups of a torsion-free Abelian group  $A$  which are subrings in every ring over  $A$ . In particular, we get a necessary and sufficient condition for the case of rank one and rank two torsion-free groups. Moreover, we introduce the notion of SR-group and obtain some related results. (pp.63-76)

## **ON HYPER $EQ$ -ALGEBRAS**

R.A. Borzooei, B. Ganji Saffar, R. Ameri

In this paper, we applied the hyper structures theory to  $EQ$ -algebras and we introduced the notion of hyper  $EQ$ -algebra which is a generalization of  $EQ$ -algebra. In the following, we define the notions of good and separated hyper  $EQ$ -algebras and state and prove some properties of (good, separated) hyper  $EQ$ -algebras. Moreover, by define the concept of (pre)filter, we construct the quotient hyper  $EQ$ -algebra. Finally, we investigate the relation between hyper  $EQ$ -algebras and hyper  $BCK$ -algebras and (weak) hyper residuated lattices. (pp. 77-96)

## ANTIPODAL BIPOLAR FUZZY GRAPHS

Muhammad Akram, Sheng-Gang Li, K.P. Shum

The concept of an antipodal bipolar fuzzy graph of a given bipolar fuzzy graph is introduced. Characterizations of antipodal bipolar fuzzy graphs are presented when the bipolar fuzzy graph is complete or strong. Some isomorphic properties of antipodal bipolar fuzzy graph are discussed. The notion of self median bipolar fuzzy graphs of a given bipolar fuzzy graph is also introduced. (pp. 97-110)

## COMPACTIFICATION OF A SOFT FUZZY PRODUCT C-SPACE

T. Yogalakshmi, E. Roja, M.K. Uma

In this paper, the soft fuzzy product C-structure is introduced and some of the relevant properties of the associated product map on soft fuzzy product C-space are studied. Moreover, compactifying the soft fuzzy product C-space through the soft fuzzy product generalized topological space on  $Q(X_1 \times X_2)$  is established. (pp. 111-124)

## DESCRIBING GREEN'S RELATIONS IN ORDERED $\Gamma$ -GROUPOIDS USING A NEW CONCEPT: FUZZY SUBSETS

A. Iampan, M. Siripitukdet

This work extends the idea of the Green's relations  $\mathcal{R}, \mathcal{L}, \mathcal{I}$  and the usual relation  $\mathcal{N}$  of ordered groupoids to ordered  $\Gamma$ -groupoids in terms of fuzzy subsets, the concept of the Green's relations  $\mathcal{R}, \mathcal{L}, \mathcal{I}$  and the usual relation  $\mathcal{N}$  of ordered  $\Gamma$ -groupoids is introduced and investigated, which is an interesting for ordered  $\Gamma$ -groupoids and some interesting characterizations of the Green's relations  $\mathcal{R}, \mathcal{L}, \mathcal{I}$  and the usual relation  $\mathcal{N}$  of ordered  $\Gamma$ -groupoids are obtained. Also, we define relations  $\mathcal{R}^F, \mathcal{L}^F, \mathcal{I}^F$  and  $\mathcal{N}^F$  of ordered  $\Gamma$ -groupoids in terms of fuzzy subsets and we prove that  $\mathcal{R}^F = \mathcal{R}, \mathcal{L}^F = \mathcal{L}, \mathcal{I}^F = \mathcal{I}$  and  $\mathcal{N}^F = \mathcal{N}$  in the same way as of the results of Kehayopulu and Tsingelis [8]. (pp. 125-140)

## PROPERTIES OF BIPOLAR FUZZY HYPERGRAPHS

M. Akram, W.A. Dudek, S. Sarwar

In this article, we apply the concept of bipolar fuzzy sets to hypergraphs and investigate some properties of bipolar fuzzy hypergraphs. We introduce the notion of  $A$ -tempered bipolar fuzzy hypergraphs and present some of their properties. We also present application examples of bipolar fuzzy hypergraphs. (pp. 141-160)

## VARIATION OF PARAMETERS METHOD FOR THIN FILM FLOW OF A THIRD GRADE FLUID DOWN AN INCLINED PLANE

Z.A. Zaidi, S.U. Jan, N. Ahmed, U. Khan, S.T. Mohyud-Din

Thin film Flow of a third grade fluid down an inclined plane is considered. Non-linear differential equation which governs the flow model is obtained by using laws of conservation along with suitable similarity transforms. Variation of Parameters Method (VPM) is then employed to solve aforementioned differential equation. Analytical solution is backed by RK-4 numerical solution and both show excellent agreement. Effects of flow parameters  $\beta$  and  $m$  on velocity field are demonstrated graphically with comprehensive discussions. (pp. 161-168)

## A NOVEL APPROACH IN HOMOTOPY PERTURBATION METHOD FOR THE EXPANSION OF NON-LINEAR TERMS

Z.A. Zaidi, N. Ahmed, U. Khan, S.T. Mohyud-Din

Homotopy Perturbation Method (HPM) is widely used in approximate calculation. The complexity of the method is to expand the nonlinear terms in series with higher powers. To make the calculation of nonlinear terms easier and friendly, we have used new algorithm based on derivatives. The same approach can be introduced to expand the higher power nonlinear terms in place of He's polynomial in HPM. (pp. 169-176)

## STRONGLY PARACOMPACT MAPPINGS

Murad Arar, Hasan Hdeib

In this paper, we define and study strongly paracompact mappings which are the fibrewise topological analogues of strongly paracompact spaces. Several characterizations and properties of strongly paractompact mappings are obtained. (pp. 177-186)

## A PRACTICAL METHOD FOR MATRIX INVERSION

Mario Reali

This report presents a matrix inversion method that has the following features: general applicability for any non-singular ( $n \times n$ ) matrix  $\mathbf{A}$  with either real or complex elements  $a_{ij}$ ,  $i, j = 1, 2, \dots, n$ ; univocally defined matrix operations; analytical representation of the sought-for inverse matrix  $A^{-1}$  as a product of three uniquely specified non-singular triangular matrices ( $A^{-1} = \mathbf{P}\mathbf{G}\mathbf{V}$ ,  $\mathbf{P}$  and  $\mathbf{V}$  lower triangular,  $\mathbf{G}$  upper triangular); and convenient (minimal) number,  $n^3$ , of required multiplication/division operations.

The inversion procedure is carried out in two stages: I) transformation of matrix  $\mathbf{A}$  into an upper triangular matrix  $\mathbf{T}$  having unit diagonal elements; II) transformation of matrix  $\mathbf{T}$  into the ( $n \times n$ ) unit matrix  $\mathbf{U}^{(n)}$  having elements  $u_{ij}^{(n)} = 0$  if  $i \neq j$ , and  $= 1$  if  $i = j$ .

The first stage conforms with a Gaussian elimination procedure that can be carried out in the natural order, through  $n$  consecutive ordered steps, since at each step univocally prescribed non-zero diagonal elements (leading pivots) are made available. A sequence of transformed non-singular ( $n \times n$ ) matrices  $\{\mathbf{A}^{(k)}\}$ ,  $k = 1, 2, \dots, n$ , having elements  $a_{ij}^{(k)}$ , is obtained with pivots  $a_{kk}^{(k)} = 1$ . The viability of the procedure is assured by the ordered use of univocally defined, very simple non-singular lower triangular ( $n \times n$ ) operational matrices  $\mathbf{P}^{(k)}$  which post-multiply  $\mathbf{A}^{(k-1)}$  ( $\mathbf{A}^{(0)}$  coinciding with  $\mathbf{A}$ ) and transform diagonal element  $a_{kk}^{(k-1)}$  into a leading pivot having a positive non-zero value given by the sum of the absolute values of all the elements in its row.

A simple numerical example is detailed for illustrating practical aspects.

The present matrix inversion method is free from any operational ambiguity. The simplicity and univocal definiteness of its transformations are expected to provide operational advantages for the development of related numerical algorithms both for finding matrix inverses and for solving systems of linear algebraic equations. Further useful features are related with the final triangular matrix factorization achieved which, in particular, allows an immediate computation of the determinants of matrices  $\mathbf{A}$  and  $\mathbf{A}^{-1}$ . (pp. 187-204)

## **FAIL-STOP DESIGNATED RECIPIENT SIGNATURE SCHEME BASED ON ELLIPTIC CURVE DISCRETE LOGARITHM PROBLEM**

**Nedal Tahat**

This paper describes a new digital signature called fail-stop designated recipient signature scheme based on elliptic curve discrete logarithm (ECDLP). The scheme allows a signer and an intended recipient to co-operatively provide a proof of forgery if an attacker can successfully forge a signature on a message  $m$ . The scheme also provides that the intended recipient is the only entity to verify the resulting signature and capable to prove the validity of signature to any third party. With this property, we show that our new signature scheme is the best alternative to solve certain problems concerning the protection of confidential documents especially those which are personally sensitive (to the owner) and is also applicable for group of recipients to verify a signature jointly (shared verification) in a group oriented environment. The scheme utilizes the inherent advantage of elliptic curve cryptosystem in terms of smaller key size and lower computational overhead to its counterpart public cryptosystems such as RSA and AlGamal. Compared with the Ismail and Yahya scheme [1], we show that our scheme is more efficient in terms of both computation and communication complexity. (pp. 205-218)

## **PROPERTIES OF $(\gamma, \gamma')$ -SEMIOPEN SETS**

**C. Carpintero, N. Rajesh, E. Rosas**

In this paper, we introduce and study the concept of  $(\gamma, \gamma')$ - $\theta$ -semiconnectedness and  $(\gamma, \gamma')$ - $\theta$ -semicomponents using  $(\gamma, \gamma')$ - $\theta$ -semiopen sets. (pp. 219-226)

## OPERATION VIA-REGULAR OPEN SETS

C. Carpintero, N. Rajesh, E. Rosas

The aim of this paper is to introduce and study the concepts of  $\gamma$ -regular open sets and their related notions in topological spaces. (pp. 227-238)

## LIE-ADMISSIBLE HYPERALGEBRAS

R.M. Santilli, T. Vougiouklis

We review Albert's axioms of Lie-admissible algebras, Santilli's geno- and hyper-mathematics with a Lie-admissible structure, and Vougiouklis  $H_v$ -hyperstructures; we then introduce Lie-admissible hyperstructures; and point out their expected relevance for biological structures and other fields. (pp. 239-254)

## FINITE $p$ -GROUPS DETERMINED BY AN INEQUALITY OF THE ORDER OF ANY TWO-ELEMENTS GENERATED SUBGROUPS

Dapeng Yu, Heng Lv, Guiyun Chen, Jinbao Li

In this note, we study a class of finite  $p$ -group determined by an inequality of the order of any two-elements generated subgroups. If  $|\langle x, y \rangle| \leq p^i \max\{|x|, |y|\}$  for all  $x, y \in G$ , then  $G$  is called a  $M_i$ -group. If  $|\langle x, y \rangle| \leq p^i |x|$  for all  $x, y \in G$ , then  $G$  is called a  $P_i$ -group. Such groups relate to a problem posed by Berkovich and Janko (Groups of prime order, Walter de Gruyter, Berlin, vol. 1, 2008) (Problem 461 and 237). In this paper, we mainly get the nilpotent class of  $P_i$ (or  $M_i$ )-groups, the exponent of derived subgroup of  $P_i$ (or  $M_i$ )-groups and  $G^{p^2} \leq Z(G)$ . (pp. 255-262)

## FINITE GROUPS WITH THEIR AUTOMORPHISM GROUPS HAVING ORDERS $4pq^2$ ( $2 < p < q$ )

Yu Zeng, Guiyun Chen

The authors find all finite nilpotent groups with automorphism groups having orders  $4pq^2$  and prove that there exists no finite non-nilpotent group such that  $|\text{Aut}(G)| = 4pq^2$  ( $2 < p < q$ ,  $p \nmid q^2 - 1$ ). So, the authors classify finite groups with their automorphism groups having orders  $4pq^2$  ( $2 < p < q$ ,  $p \nmid q^2 - 1$ ). (pp. 263-276)

## FINITE GROUPS WITH $6PQ$ ELEMENTS OF THE LARGEST ORDER

Yong Xu, Juanjuan Gao, Hailong Hou

It is an interesting topic to determine the structure of a finite group with a given number of elements of the largest order. In this article, it is proved that finite groups with  $6pq$  elements of the largest order, where  $p, q$  are primes and  $13 < p < q$ , are solvable. (pp. 277-284)



**THE BLACK BOX OF ECONOMIC INTERDEPENDENCE  
IN THE PROCESS OF STRUCTURAL CHANGE.  
EU AND EA ON THE STAGE**

T.F.M. Chang, L.C. Piccinini, L. Iseppi, M.A. Lepellere

The search of a hierarchy in economic systems, using triangulation method, has a long tradition in economics. This study, after revisiting Authors' optimization algorithm, based on "path restricted unimodularity", tries to cast new light into the black box of the rules governing the transformation of the economic structure in growth process. Inter-temporal, cross-sectional and simulated comparisons have been made on European Community, Union and Euro Area input-output tables (1965-2007) aiming at verifying above all whether the asymmetrical hierarchy prevailed or not. The main results prove that the agents (branches) work in competition rather than in cooperation, thus the dominance criterion rules inducing asymmetry. Contrary to expectations, the richest Euro Area presents a more hierarchical structure than European Union and is more reactive to any fluctuation of final demand. Also the classical Agribusiness complex, important for investigating new comers, presents a highly inductive triangular arrangement and plays an intermediate function. (pp. 285-306)

**A COMMUTATIVE REGULAR MONOID ON ROUGH SETS**

B. Praba, V.M. Chandrasekaran, A. Manimaran

In this paper, we intend to study an algebraic approach on rough sets. We introduce the concept of rough semigroup, rough monoid and rough ideals on the set of all rough sets for the given information system together with the operation Praba  $\Delta$ . We illustrate these concepts through examples. (pp. 307-318)

**CONTROLLABILITY RESULTS FOR SECOND ORDER  
IMPULSIVE NEUTRAL FUNCTIONAL INTEGRODIFFERENTIAL  
INCLUSIONS WITH INFINITE DELAY**

F. Paul Samuel, T. Gunasekar, M. Mallika Arjunan

This paper is concerned with the controllability of a partial neutral functional integrodifferential inclusion of second order with impulse effect and infinite delay in Banach spaces. The controllability of mild solutions using a fixed point theorem for contraction multi-valued maps and without assuming compactness of the family of cosine operators. (pp. 319-332)

## **AN IMPLICIT METHOD FOR SOLVING NONCONVEX VARIATIONAL INEQUALITIES**

**Eman Al-Shemas**

This paper presents a predictor-corrector algorithm for solving the strongly nonlinear general nonconvex variational inequality, which is a class of nonconvex variational inequalities involving three nonlinear operators. We establish the equivalence between the strongly nonlinear general nonconvex variational inequalities and the fixed point problem, and show that the convergence of the predictor-corrector method only requires pseudomonotonicity, which is a weaker condition than monotonicity. Some special cases are also discussed. (pp. 333-342)

## **FIXED POINT THEOREMS ON INTUITIONISTIC FUZZY QUASI-METRIC SPACES WITH APPLICATION TO THE DOMAIN OF WORDS**

**Bhavana Deshpande, Rohit Pathak**

In this paper, we prove intuitionistic fuzzy quasi-metric version of the Banach contraction principle which extend the famous Grabiec fixed point theorem. By using this result we show the existence of fixed point for contraction mappings on the domain of words and apply this approach to deduce the existence of solution for some recurrence equations associated to the analysis of Quicksort algorithms and divide and Conquer algorithms, respectively. (pp. 343-354)