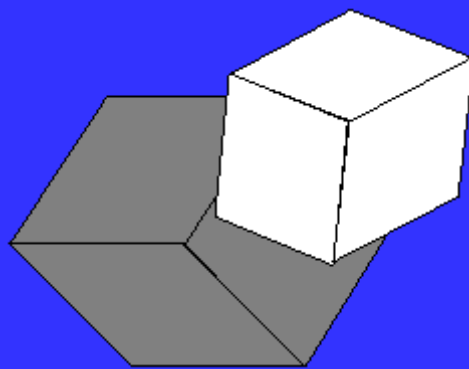


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## Papers Abstracts



**FORUM**

### INTERVAL-VALUED FUZZY HYPERGRAPH AND INTERVAL-VALUED FUZZY HYPEROPERATIONS

Yuming Feng, Dan Tu, Hongyi Li

We first construct two interval-valued fuzzy hyperoperations by the use of  $[\alpha, \beta]$ -cut on an interval-valued  $[\alpha, \beta]$ -fuzzy hypergraph and list some properties of them. Then we construct another two interval-valued fuzzy hyperoperations by the use of  $\langle \alpha, \beta \rangle$ -cut on an interval-valued  $\langle \alpha, \beta \rangle$ -fuzzy hypergraph and also list some properties of them. Lastly, we study the interval-valued fuzzy hyperstructure associated to the latter two interval-valued fuzzy hyperoperations and we can see that the hyperstructure is almost an interval-valued superlattice. (pp. 1-12)

### SYNTACTIC FUZZY MONOIDS

Antonios Kalampakas, Olympia Louscou-Bozapalidou

Fuzzy monoids and fuzzy congruences are introduced and the syntactic fuzzy monoid  $M_L$  associated to a subset  $L$  of a fuzzy monoid  $M$  is constructed. It is shown that  $M_L$  is minimal among all fuzzy epimorphisms  $h : M \rightarrow M'$  whose kernel saturates  $L$ . The subset  $L$  is said to be fuzzy recognizable whenever  $M_L$  is finite. The so obtained class is closed under boolean operations and inverse morphisms. (pp. 13-22)

### APPLICATIONS OF THE UNITING ELEMENTS METHOD

R. Mahjoob, T. Vougiouklis

We present the Uniting Elements Method introduced by Corsini-Vougiouklis in 1989 [5]. Some applications of the uniting elements method on the classical algebra are presented and finally we connect them with  $\partial$ -structures and the other classes of hyperstructures. (pp. 23-34)

### GENERALIZED HESITANT FUZZY SOFT SETS

Bin Chen

In this paper, generalized hesitant fuzzy soft sets and some operations on generalized hesitant fuzzy soft sets are defined and some of their properties are studied. Applications of generalized hesitant fuzzy soft sets in decision-making are investigated. (pp. 35-54)

### A GENERALIZED COMMON FIXED POINT THEOREM FOR SIX SELF-MAPS

T. Phaneendra, D. Surekha

A recent common fixed point theorem of Kikina and Kikina (2011) has been extended to two triads of self-maps through the notions of weak compatibility and the property (EA), under an implicit-type relation and restricted completeness, namely orbital completeness of the space. (pp. 55-64)

### ON GENERALIZED WEAK $\mathcal{I}$ -LIFTING MODULES

Tayyeb Amouzegar

In this paper, the concept of  $\mathcal{I}$ -lifting modules is extended to weak  $\mathcal{I}$ -lifting and generalized weak  $\mathcal{I}$ -lifting modules. Some properties of these modules are investigate and some results about  $\mathcal{I}$ -lifting modules are extended. pp. 65-72

## **A-NUMERICAL RADIUS OF A-NORMAL OPERATORS IN SEMI-HILBERTIAN SPACES**

M. Faghih-Ahmadi, F. Gorjizadeh

Let  $\mathcal{H}$  be a Hilbert space and  $A$  be a positive bounded linear operator on  $\mathcal{H}$ . The semi-inner product  $\langle h, k \rangle_A = \langle Ah, k \rangle$ ,  $h, k \in \mathcal{H}$ , induces a seminorm for a bounded linear operator  $T$ , which is defined by

$$\|T\|_A = \sup\{\|Th\|_A / \|h\|_A : \|h\| \neq 0\}.$$

The main purpose of this paper is to prove that  $\|T\|_A$  equals the  $A$ -numerical radius of  $T$ , when  $T$  is an  $A$ -normal operator. This generalizes the similar result for a normal operator on a Hilbert space.

(pp. 73-78)

## **FINITE GROUPS WITH SOME QUASINORMAL AND SELF-NORMALIZING SUBGROUPS**

Zhangjia Han, Chao Yang

A subgroup  $H$  of a finite group  $G$  is called quasinormal in  $G$  if  $HK = KH$  holds for every subgroup  $K$  of  $G$ . In this paper, we mainly give the structure of finite nonabelian simple groups in which every cyclic subgroups of order 2 and order 4 of every second maximal subgroups is either quasinormal or self-normalizing.

(pp. 79-86)

## **QUOTIENT HYPER HOOP-ALGEBRAS**

R.A. Borzooei, H.R. Varasteh, K. Borna

In this paper, by considering the notion of hyper hoop-algebras, we define the concepts of (strong) regular relations on hyper hoop-algebras and investigate some properties of them. Then we construct a quotient (hyper) hoop-algebra by a (strong)regular relation on hyper hoop-algebras. Finally, we define the notion of maximal filter and we investigate the relation between quotient simple hyper hoop-algebras and maximal filters.

(pp. 87-100)

## **GENERALIZED CUBIC SOFT SETS AND THEIR APPLICATIONS TO ORDERED ABEL-GRASSMANN'S GROUPOIDS**

Asad Ali, Madad Khan, Fu-Gui Shi

In this paper, we introduced the concept of generalized cubic soft left (resp., right, bi-) ideals to study the structural properties of ordered  $\mathcal{AG}$ -groupoids. We characterized intra-regular ordered  $\mathcal{AG}$ -groupoids using the properties of generalized cubic soft ideals.

(pp. 101-124)

## **A STUDY ON FUZZY INTERIOR HYPERIDEALS IN ORDERED SEMIHYPERGROUPS**

Jian Tang, Bijan Davvaz, Yanfeng Luo

In this paper, we first introduce the concept of fuzzy interior hyperideals of an ordered semihypergroup  $S$  by the ordered fuzzy points of  $S$ , and investigate its related properties. In particular, we give the characterization of fuzzy interior hyperideal generated by a fuzzy subset in an ordered semihypergroup. Furthermore, the idea of normal fuzzy interior hyperideals in ordered semihypergroups is given and several related characterization theorems are provided. Finally, some new characterizations of semisimple ordered semihypergroups by the properties of fuzzy interior hyperideals are given.

(pp. 125-146)

## ON $L$ -FUZZY 2-ABSORBING IDEALS

Ahmad Yousefian Darani, Ghader Ghasemi

Let  $L$  be a complete lattice. In this paper we introduce various definitions of  $L$ -fuzzy 2-absorbing ideals of a commutative ring  $R$  and give some basic results concerning these classes of ideals. (pp. 147-154)

## ON GENERALIZED RITT ORDER OF ENTIRE FUNCTIONS REPRESENTED BY VECTOR VALUED DIRICHLET SERIES

Sanjib Kumar Datta, Tanmay Biswas, Jinarul Haque Shaikh

In this paper, we introduce the idea of generalized Ritt order of entire function (respectively generalized Ritt lower order) represented by a vector valued Dirichlet series. Hence we study some growth properties of two of entire functions represented by a vector valued Dirichlet series on the basis of their generalized Ritt orders and generalized Ritt lower orders. (pp. 155-160)

## COMPARATIVE GROWTH ANALYSIS OF FUNCTIONS ANALYTIC IN THE UNIT DISC DEPENDING UPON THEIR RELATIVE $L^*$ -ORDERS AND RELATIVE $L^*$ -LOWER ORDERS

Sanjib Kumar Datta, Tanmay Biswas, Pulak Sahoo

In the paper the ideas of relative Nevanlinna  $L^*$ -order and relative Nevanlinna  $L^*$ -lower order of an analytic function with respect to an entire function in the unit disc  $U = \{z : |z| < 1\}$  are introduced. Hence, we study some comparative growth properties of composition of two analytic functions in the unit disc  $U$  on the basis of relative Nevanlinna  $L^*$ -order and relative Nevanlinna  $L^*$ -lower order. (pp. 161-166)

## A NEW TYPE OF COMPACT SPACES AND CLOSED SPACES

G. Shanmugam, N. Rajesh

In this paper, we have introduced and studied the concepts of  $sg\alpha$ -compact space and  $sg\alpha$ -closed space by means of nets and filterbases. pp. 167-178

## ANALYSIS OF STEADY THREE-DIMENSIONAL HYDROMAGNETIC STAGNATION POINT FLOW TOWARDS A STRETCHING SHEET WITH HEAT GENERATION

A.K. Alomari, Fadi Awawdeh, Saeid Abbasbandy, O. Alsayyed, F. Bani Ahmad

This paper is concerned with the three-dimensional hydromagnetic stagnation point flow towards a stretching sheet with heat generation. It is assumed that a uniform magnetic field is applied normal to the plate which is maintained at a constant temperature. The coupled partial differential equations are reduced into ordinary differential equations by using similarity transformations. The series solutions of the coupled non-linear system is obtained using an analytical technique namely the homotopy analysis method (HAM). We use a two-stage method, where both the convergence control parameter and the initial guess are optimally selected to minimize the residual error due to the approximation. To do the latter, we consider a family of initial guesses parameterized by a constant which gives the decay rate of the solutions. In several cases considered, we are able to obtain solutions with extremely small residual errors after relatively few iterations are computed. The convergence, salient features of the flow and heat transfer characteristics are analyzed and discussed in detail through graphs. We also discuss the effect of the strength of the uniform magnetic field, the surface stretching velocity, and the heat generation/absorption coefficient on both the flow and heat transfer. (pp. 179-194)

## THE INFLUENCE ON THE ASYMPTOTICS OF THE RANDOM WALKS CAUSED BY THE VARIATION OF THE INCREMENTS

Changjun Yu, Dongya Cheng

Let  $\{X_n : n \geq 1\}$  be a sequence of independent and identically distributed random variables with a common mean  $\mu \in (-\infty, 0)$  and  $\{S_n : n \geq 0\}$  be the random walk generated by  $\{X_n : n \geq 1\}$ . For any  $\varepsilon \in (0, -\mu)$ , let  $\{S_n^{(\pm\varepsilon)} : n \geq 0\}$  be the random walks generated by  $\{X_n \pm \varepsilon : n \geq 1\}$ . This paper considers the limits of  $P\left(\sup_{n \geq 0} S_n^{(\pm\varepsilon)} > x\right) / P\left(\sup_{n \geq 0} S_n > x\right)$  as  $x \rightarrow \infty$ . (pp. 195-202)

## HYPERCYCLIC AND SUPERCYCLIC OPERATORS SATISFYING GENERALIZED A-WEYL'S THEOREM

Mohamed Amouch, Youness Faouzi

A Banach space operator  $T$  satisfies generalized a-Weyl's theorem if the complement of its upper semi B-Weyl spectrum in its approximate point spectrum is the set of eigenvalues of  $T$  which are isolated in the approximate spectrum of  $T$ . In this note we characterize hypercyclic and supercyclic operators satisfying generalized a-Weyl's theorem. (pp. 203-210)

## THE QUOTIENT ULTRA-GROUPS

Gholamreza Moghaddasi, Parvaneh Zolfaghari

The main purpose of this paper is to construct the quotient ultra-groups, which are based on congruences. By these means we can present fundamental theorem and Lagrange theorem for the ultra-groups. Also, we show not necessary that the order of each element of the ultra-group divided by the order of the ultra-group. (pp. 211-218)

## ON SEMI $p$ -COVER-AVOIDING SUBGROUPS AND $\mathcal{H}$ -SUBGROUPS OF FINITE GROUPS

Lili Wang, Aifa Wang, Guiyun Chen

In recent years, some authors gave many valuable results on the structure of a finite group, provided its some subgroups have semi  $p$ -cover-avoiding property. At the same time, some interesting conclusions about finite group were also obtained under the assumption that some subgroups of  $G$  belong to  $\mathcal{H}(G)$ . All these results are important in the research of finite groups. Here the authors discussed the connection between the semi  $p$ -cover-avoiding subgroups and the  $\mathcal{H}$ -subgroups on the structure of a finite group, and again obtained some more interesting results about finite groups. (pp. 219-230)

## DYNAMICS IN A COMPETITIVE LOTKA-VOLTERRA PREDATOR-PREY MODEL WITH MULTIPLE DELAYS

Changjin Xu, Yusen Wu

In this paper, we investigate a discrete competitive Lotka-Volterra predator-prey model with multiple delays. For general non-autonomous case, sufficient conditions which ensure the permanence and the global stability of the system are derived by applying the differential inequality theory; For periodic case, sufficient conditions which guarantee the existence of an unique globally stable positive periodic solution are established. Some numerical simulations which illustrate our theoretical findings are carried out. (pp. 231-244)

## SEPARATION AXIOMS BETWEEN $T_0$ AND $T_1$ ON LATTICES AND LATTICE MODULES

Gulsen Ulucak, Unsal Tekir, Kursat Hakan Oral

In this study, we characterize the lattices and lattice modules whose prime spectrum satisfy some of the separation axioms between  $T_0$  and  $T_1$ . This characterizations are the notion of  $pm$ -lattice,  $m$ -lattice,  $\varepsilon$ -lattice, e.t.c. Similarly, this characterizations are the notion of  $PM$ -lattice module,  $\mu$ -lattice module,  $\varepsilon$ -lattice module, etc. (pp. 245-256)

## A NEW CHARACTERIZATION OF THE ALTERNATING GROUP $A_8$ BY ITS ORDER AND LARGE DEGREES OF ITS IRREDUCIBLE CHARACTER

Yanxiong Yan, Yuming Feng, Lili Li, Haijing Xu

It is well-known that characters of a finite group can give information about its structure. Also it is known that a finite simple group can uniquely determined by its character table. Here the authors attempt to investigate how to characterize a finite group by using less information of its character table, and successfully characterize the alternating group  $A_8$  by its order and at most two irreducible character degrees of the character table. (pp. 257-264)

## ON SOME ALGEBRAIC PROPERTIES OF SOFT SETS

V. Srinivasa Kumar, Khaja Moimuddin

This paper studies some algebraic and lattice properties of soft sets. A soft binary operation is introduced and a few interesting results are investigated in this context. (pp. 265-270)

## FUZZY PARAMETERIZED FUZZY SOFT NORMAL SUBGROUPS OF GROUPS

Wenjun Pan, Qiumei Wang, Jianming Zhan

In the present paper, we redefine the concept of  $FPFS$ -sets in algebra systems, which is a novel way that is different from the definition of  $FPFS$ -sets in hemirings by Liu [10]. Based on the definition, we put forth  $FPFS$ -groups,  $FPFS$ -normal subgroups and  $FP$ -equivalent fuzzy soft normal subgroups of groups. Further, some properties and characterizations are investigated. Finally, aggregate fuzzy normal subgroups of groups are given. (pp. 271-282)

## PASSAGE OF PROPERTY $(gw)$ FROM TWO OPERATORS TO THEIR TENSOR PRODUCT

Mohamed Amouch, Hassane Zguitti

A Banach space operator satisfies property  $(gw)$  if the complement of its B-Weyl essential approximate point spectrum in its approximate point spectrum is the set of isolated eigenvalues of the operator. We give necessary and/or sufficient conditions ensuring the passage of property  $(gw)$  from two Banach space operators  $A$  and  $B$  to their tensor product. In particular, we present a revised version of Theorem 2.3 in [20]. pp. 283-292

## ADAPTIVE CONTROLLER FOR GENERAL NETWORKED MANIPULATORS WITH UNCERTAIN DYNAMICS

Xingjie Wu, Dapeng Xie, Hui Zhou, Zongmin Qiao

In this paper, two adaptive tracking control algorithms for redundant and non-redundant networked nonidentical robot manipulators are proposed, where the networked topology graph is direct and has a spanning tree. It is shown that, the distributed feedback controllers can be achieve end-effectors time-varying positions, velocities and sub-task tracking for manipulators with parametric uncertainty in the Lagrange dynamics. Moreover, the designed distributed tracking control algorithms in this paper is even a small portion of followers can get the leader's position information. Simulation example is presented to illustrate the performance of the proposed controller. pp. 293-306

## REPRODUCING KERNEL HILBERT SPACE METHOD FOR SOLVING FREDHOLM INTEGRO-DIFFERENTIAL EQUATIONS OF FRACTIONAL ORDER

**Samia Bushnaq, Banan Maayah, Morad Ahmad**

This paper presents a computational technique for solving linear and nonlinear Fredholm integro-differential equations of fractional order. In addition, examples that illustrate the pertinent features of this method are presented, and the results of the study are discussed. Results have revealed that the RKHSM yields efficiently a good approximation to the exact solution. pp. 307-318

## PRIMAL-DUAL INTERIOR-POINT ALGORITHM FOR LO BASED ON A NEW KERNEL FUNCTION

**Xin Li, Mingwang Zhang, Ping Ji**

Based on a new kernel function, a large-update primal-dual interior-point algorithm for solving linear optimization is proposed. The kernel function is used both for determining the search directions and for measuring the distance between the given iterate and the  $\mu$ -center for the algorithm. By using several new technical lemmas, the iteration complexity bound as  $O(\sqrt{n} \log n \log \frac{n}{\varepsilon})$  is obtained, which coincides with the currently best iteration complexity bounds for large-update methods. In addition, we present some preliminary numerical results. pp. 319-334

## SIMPLE ITERATIVE TECHNIQUE FOR SOLVING SOME MODELS OF NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS USING HAAR WAVELET

**Inderdeep Singh, Sheo Kumar**

We present here, simple iterative technique for solving some models of nonlinear partial differential equations using Haar wavelet. Numerical examples are given to establish the efficiency and accuracy of the present method. pp. 335-344

## SOLVING THE FRACTIONAL FORNBERG-WHITHAM EQUATION BY MEANS OF THE OPTIMAL q-HOMOTOPY ANALYSIS METHOD (Oq-HAM)

**Yasser S. Hamed, Mohamed S. Mohamed**

The main aim of this paper is to propose a new and simple algorithm namely optimal q-homotopy analysis method (Oq-HAM), to obtain the approximate analytical solutions to solve the nonlinear Fornberg–Whitham equation with fractional time derivative. The fractional derivatives are taken in the Caputo sense. Comparison of Oq- HAM with the homotopy analysis method (HAM) and the homotopy perturbation method (HPM) are made. The results reveal that the Oq-HAM has more accuracy than the others. Finally, numerical example is given to illustrate the accuracy and stability of this method. Comparison of the approximate solution with the exact solutions also we show that the proposed method is very efficient and computationally attractive. A new efficient approach is proposed to obtain the optimal value of convergence controller parameter  $\hbar$  to guarantee the convergence of the obtained series solution. pp. 345-358

## QUASI-FREDHOLM, SAPHAR SPECTRA FOR $C_0$ SEMIGROUPS GENERATORS

**Abdelaziz Tajmouati, Hamid Boua, Mohammed Karmouni**

In this work, we show that the spectral inclusion of semigroups hold for Saphar, essentially Saphar and quasi-Fredholm spectra. Some stabilities results are also established. pp. 359-366

## NEW SOLITARY WAVE AND MULTIPLE SOLITON SOLUTIONS FOR THE TIME-SPACE FRACTIONAL BOUSSINESQ EQUATION

**H.M. Jaradat**

The aim of this paper are in two fold: First, introduce a new simplified bilinear method based on a transformation method combined with the Hirota bilinear sense. Second, apply this new technique to study the time-space fractional Boussinesq equation. To the best of my knowledge, the proposed work present new N-soliton solutions of the fractional Boussinesq equation. These new exact solutions extend previous results and help us to explain the properties of multidimensional nonlinear solitary waves in shallow water. Parametric analysis is carried out in order to illustrate that the soliton amplitude, width and velocity are affected by the coefficient parameters in the equation. pp. 367-376

## THE COMPOSITION, CONVERGENCE AND TRANSITIVITY OF POWERS AND ADJOINT OF GENERALIZED FUZZY MATRICES

**Jing Jiang, Xin-an Tian**

Path algebras are additively idempotent semirings and generalize Boolean algebras, fuzzy algebras, distributive lattices and inclines. Thus the Boolean matrices, the fuzzy matrices, the lattice matrices and the incline matrices are prototypical examples of matrices over path algebras. In this paper, generalized fuzzy matrices are considered as matrices over path algebras. Compositions of generalized fuzzy matrices are discussed, and a new transitive matrix is constructed from given matrices. Furthermore, the transitivity and the convergent index for powers of generalized fuzzy matrices are studied, some properties of powers are also established through adjoint matrix, and finally the invertibility of a matrix is investigated. Some results obtained here generalize and develop the corresponding ones on fuzzy matrices, lattice matrices and incline matrices shown in the references. pp. 377-398

## NUMERICAL SOLUTION OF FRACTIONAL RELAXATION-OSCILLATION EQUATION USING CUBIC B-SPLINE WAVELET COLLOCATION METHOD

**Raghvendra S. Chandel, Amardeep Singh, Devendra Chouhan**

A relaxation oscillator is a kind of oscillator based on a behavior of physical system's return to equilibrium after being disturbed. The relaxation-oscillation equation is the primary equation of relaxation and oscillation processes. The relaxation-oscillation equation is a fractional differential equation with initial conditions. In this paper, the approximate solutions of relaxation-oscillation equation are obtained by developing the wavelet collocation method to fractional differential equations using cubic B-spline wavelet. Analytical expressions of fractional derivatives in caputo sense for cubic B-spline functions are presented. The main advantage of the proposed method is that it transforms such problems into a system of algebraic equations which is suitable for computer programming. The reliability and efficiency of the proposed method are demonstrated in the numerical examples. pp. 399-414

## APPLICATION OF NEW GENERALIZED $(G'/G)$ -EXPANSION METHOD TO THE $(3 + 1)$ -DIMENSIONAL KADOMTSEV-PETVIASHVILI EQUATION

**Nur Alam, M. Ali Akbar, M.G. Hafez, Fethi Bin Muhammad Belgacem**

In this research article, seeking parameters dependent exact solutions, we implement the new generalized  $(G'/G)$ -expansion to the  $(3 + 1)$ -dimensional Kadomtsev-Petviashvili equation. The traveling wave solutions are expressed in terms of the hyperbolic functions, trigonometric functions, as well as rational functions. Herein, established is therefore the fact that the new generalized  $(G'/G)$ -expansion method offers an efficient and influential mathematical tool for constructing exact solutions of nonlinear evolution equations (NLEEs). In mathematical physics, finding the exact solutions of NLEEs reveals the salient features of the inner mechanism of possibly hidden complex physical phenomena, modeled by the given equations. In consequence to our current work and setup, not only does the new method appear to be straightforward and user-friendly, but also, it turns out easily implementable by computer programmed and symbolic algebra packages, yielding fast, albeit accurate results. pp. 415-428



## COLORING OF BIFUZZY GRAPHS

Sundas Shahzadi, Muhammad Akram

In this paper, we introduce coloring function of a bifuzzy edge graph  $G = (V, B)$  using  $(\alpha, \beta)$ -cuts of  $G$  and determine the chromatic number of  $G$ . We compute  $k$ -coloring of bifuzzy graph  $\tilde{G} = (V, A, B)$  based on the family of bifuzzy sets on  $V$ . We establish strong coloring of a bifuzzy graph and compute strong chromatic number. We also present a new channel assignment problem by using a bifuzzy graph. pp. 429-444

## ON $m$ -POLAR FUZZY LIE SUBALGEBRAS

Muhammad Akram, Adeel Farooq, K.P. Shum

The notion of an  $m$ -polar fuzzy set is a generalization of a bipolar fuzzy set. We apply the concept of  $m$ -polar fuzzy sets to Lie algebras. We introduce the concept of  $m$ -polar fuzzy Lie subalgebras of a Lie algebra and investigate some of their properties. We also present the homomorphisms between the Lie subalgebras of a Lie algebra and their relationship between the domains and the co-domains of the  $m$ -polar fuzzy subalgebras under these homomorphisms. pp. 445-454

## COMMUTATIVE FUNDAMENTAL RELATION IN FUZZY HYPERSEMIGROUPS

T. Nozari

We introduce and study the construction of commutative fundamental relation in fuzzy hypersemigroups and investigate its basic properties. We will determine some necessary and sufficient conditions so that this relation is transitive in fuzzy hypersemigroups. Also we show that this relation is transitive in every fuzzy hypergroup. pp. 455-464

## ON WEAKLY PRIME $L$ -IDEALS

R. Mahjoob

Let  $L$  be a complete lattice. We introduce and study the notion of weakly prime  $L$ -ideals of a commutative ring with identity and investigate their properties. In particular we characterize weakly prime  $L$ -ideals of  $R$ , where  $R$  is an integral domain and  $L$  is a chain. pp. 465-472

## ROUGH FUZZY $n$ -ABSORBING ( $n$ -ABSORBING PRIMARY) IDEAL IN COMMUTATIVE RINGS

Bijan Davvaz, Brahim Fahid

In this paper, we introduce the notions of rough  $n$ -absorbing ( $n$ -absorbing primary) ideals and rough fuzzy  $n$ -absorbing ( $n$ -absorbing primary) ideals in a ring, and give some properties of such ideals. Also, we discuss the relations between the upper and lower rough  $n$ -absorbing ( $n$ -absorbing primary) ideals and the upper and lower approximations of their homomorphism images. pp. 473-482

## ON THE APPROXIMATE SOLUTIONS OF SYSTEMS OF ODEs BY LEGENDRE OPERATIONAL MATRIX OF DIFFERENTIATION

F. Bani-Ahmad, A.K. Alomari, A. Sami Bataineh, J. Sulaiman, I. Hashim

In this article, a general framework for solving system of ordinary differential equations by implementing a relatively new numerical technique called the Legendre operational matrix of differentiation is presented for the first time. This method can be an effective procedure to obtain analytic and approximate solutions for different systems of ordinary differential equations. Different from other numerical techniques, shifted Legendre polynomials and their properties are employed for deriving a general procedure for forming this matrix. Comparisons are made between approximate solutions, exact solutions and numerical ones for several examples. Moreover, estimate error for the given algorithm is presented. pp. 483-494

## MORITA EQUIVALENCE FOR SEMIRINGS WITHOUT IDENTITY

Hongxing Liu

In this paper, we study the Morita theory for semirings with slu. We characterize the equivalent functors between the subcategories of right semimodules over semirings with slu. Also, we give an equivalent condition of the Morita context of semirings (not necessarily with slu) and study the corresponding results in semirings with slu settings. Finally, we apply the results to semirings with identity. pp. 495-508

## TRIGONOMETRIC FUNCTIONS – ONE POSSIBLE DEFINITION

František Mošna

The paper deals with trigonometric functions, presents several possibilities of their introducing and offers one definition based on geometrical ideas and using analytical means. The basic properties of such functions are derived, too. pp. 509-518

## PRICING MATURITY GUARANTEE WITH DYNAMIC WITHDRAWAL BENEFIT UNDER VASICEK INTEREST RATE MODEL

Jie Pan

Motivated by Ko et al. (2010), who propose a new equity-linked product called “maturity guarantee with dynamic withdrawal benefit” (MGDWB), we consider the pricing of this product under a Vasicek stochastic interest rates framework. The explicit pricing formulas for the dynamic withdrawal benefit (DWB) payment stream and the maturity guarantee can be obtained when the DWB payment level is set to be a function of zero-coupon bond. pp. 519-534

## GRADED SEMIPRIME AND GRADED WEAKLY SEMIPRIME IDEALS

Rashid Abu-Dawwas

Let  $G$  be a group and  $R$  be a commutative  $G$ -graded ring with nonzero unity 1. In this article, we define the graded semiprime ideals and the graded weakly semiprime ideals and we introduce several results concerning such ideals. pp. 535-542

## DIFFERENTIAL SANDWICH THEOREMS FOR $p$ -VALENT FUNCTIONS ASSOCIATED WITH A CERTAIN GENERALIZED DIFFERENTIAL OPERATOR AND INTEGRAL OPERATOR

Feras Yousef, A.A. Amourah, M. Darus

The purpose of this paper is to derive some subordination and superordination results for functions of the form  $f(z) = z^p + \sum_{k=p+1}^{\infty} a_k z^k$  which are  $p$ -valent in the open unit disk  $\mathbb{U} = \{z \in \mathbb{C} : |z| < 1\}$  by using certain differential operator  $A_{\lambda,p}^n(\alpha, \beta, \mu)f(z)$  and integral operator  $F_p^m(\rho, \vartheta)f(z)$ . Some special cases are also considered. pp. 543-556

## SOME REACTION DIFFUSION TYPE EQUATIONS IN QUANTUM MECHANICS

B.S. Lakshmi, S.S. Phulsagar

Many second order partial differential equations are expressed as a pair of coupled first order partial differential equations. A surprisingly large variety of problems from quantum theory to information sciences can be studied. We examine certain novel features of the solutions of equations arising from these areas of study. pp. 557-566

## SEARCH OF GOOD ROTATION PATTERNS THROUGH EXPONENTIAL TYPE REGRESSION ESTIMATOR IN SUCCESSIVE SAMPLING OVER TWO OCCASIONS

Housila P. Singh, Surya K. Pal

The problem of estimating the finite population mean on the second (current) occasion in successive sampling over two occasions has been discussed. Utilizing all the readily available information from first and second occasions, an efficient estimation procedure through exponential type regression estimator has been developed. It has been shown that the proposed procedure is more efficient than the one recently reported by Singh and Homa [17]. Optimum replacement policy relevant to the suggested estimation procedure has been advocated. In support of the present study a numerical illustration is given. pp. 567-582

## SOME NEW INTEGRAL INEQUALITIES OF HADAMARD-SIMPSON TYPE FOR EXTENDED $(s, m)$ -PREINVEX FUNCTIONS

Yujiao Li, Tingsong Du, Bo Yu

The  $(s, m)$ -preinvex function and the extended  $(s, m)$ -preinvex function are firstly introduced. An integral identity for differentiable functions is then derived. Based on this integral identity, some Hadamard-Simpson type integral inequalities are investigated, which generalizes the existing similar type integral inequalities. pp. 583-600

## A NEW CORRECTOR-PREDICTOR ALGORITHM FOR CONVEX QUADRATIC SEMIDEFINITE OPTIMIZATION

Xin Li, Yan Chen, Xiaohui Cao

In this paper, we propose a new corrector-predictor algorithm for convex quadratic semidefinite optimization problem based on a new proximity measure. The search direction is obtained by an equivalent algebraic transformation of the centering equation. At each iteration, the algorithm is composed of a corrector step and a predictor step. The predictor step uses line search schemes requiring the reduction of the duality gap, while the corrector step is used to restore the iterates to the neighborhood of the central path. Finally, the algorithm has the currently best-known iteration complexity. pp. 601-616

## ROUGH FUZZY GROUPS AND ROUGH SOFT GROUPS

Wenjun Pan, Jianming Zhan

By means of Dubois and Prade's idea, we introduce the concept of rough fuzzy normal subgroups and investigate some related properties. Combining rough sets and soft sets, rough soft normal subgroups with respect to a normal subgroup of groups in Pawlak approximation spaces are introduced. Moreover, we investigate the relationships between lower and upper rough soft normal subgroups with respect to normal subgroups. Finally, decision making methods in rough soft sets are put forward and some related algebraic and applied examples are given. pp. 617-628

## A NUMERICAL SOLUTION OF THE ARBITRARY ORDER WEAKLY SINGULAR INTEGRAL USING BLOCK-PULSE FUNCTIONS AND APPLICATIONS

Hao Song, Jun Huang, Mingxu Yi, Yalin Pan

The purpose of this paper is to obtain the approximation of the arbitrary order weakly singular integral using Block-Pulse functions. The obtained results can be used to solve the numerical solution of higher order linear and nonlinear weakly singular Volterra integral equation of the second kind. Furthermore, the initial equations are transformed into a system of algebraic equations. Finally, some examples are given to demonstrate the validity and applicability of this approach, results of these examples show that this new method is an efficient algorithm. pp. 629-638

## ON $P$ -DERIVATIONS AND $P$ -JORDAN DERIVATIONS OF A RING

Fang Li, Lingyu Wan

In this paper, we generalize ordinary derivation and Jordan derivation of a ring to the concepts of  $P$ -derivation and  $P$ -Jordan derivation of a ring respectively. Some properties, e.g. the composition of  $P$ -derivations and  $P$ -Jordan derivations, are given. Moreover, it proved that if  $R/P(R)$  is 2-torsion free for a ring  $R$  and its prime radical  $P(R)$ ,  $P$ -Jordan derivations of  $R$  are  $P$ -derivations. More mainly, some conclusions on the commutativity of  $R/I$  and  $R/P(R)$  are obtained via  $P$ -derivations and  $P$ -Jordan derivations, for a prime ideal  $I$  of  $R$ . pp. 639-650

## ON WEAKLY $\pi g$ -CLOSED SETS IN TOPOLOGICAL SPACES

O. Ravi, S. Chandrasekar, S. Ganesan

In this paper, the concepts of weakly  $\pi g$ -continuous functions, weakly  $\pi g$ -compact spaces and weakly  $\pi g$ -connected spaces are introduced and some of their properties are investigated. pp. 651-666

## UP-ALGEBRAS CHARACTERIZED BY THEIR ANTI-FUZZY UP-IDEALS AND ANTI-FUZZY UP-SUBALGEBRAS

Waraphorn Kaijajae, Polatip Pongsumpao, Saranya Arayarangsi, Aiyared Iampan

In this paper, anti-fuzzy UP-ideals and anti-fuzzy UP-subalgebras concepts of UP-algebras are introduced and proved some results. We also introduce the notions of Cartesian product and dot product of fuzzy sets, and then we study related properties. Further, we discuss the relation between anti-fuzzy UP-ideals (resp. anti-fuzzy UP-subalgebras) and level subsets of a fuzzy set. Anti-fuzzy UP-ideals and anti-fuzzy UP-subalgebras are also applied in the Cartesian product of UP-algebras. pp. 667-692

## ON $p$ -NILPOTENCY OF FINITE GROUPS

Xinjian Zhang, Yong Xu

A subgroup  $H$  of a finite group  $G$  is said to be weakly  $s$ -supplemently embedded subgroup in  $G$  if there exists a subgroup  $T$  of  $G$  such that  $G = HT$  and  $H \cap T \leq H_{se}$ , where  $H_{se}$  is an  $s$ -quasinormally embedded subgroup of  $G$  contained in  $H$ . In this paper we investigate the structure of  $G$  under the assumption that some subgroups of  $P$  are weakly  $s$ -supplemently embedded in  $G$ , and some new criteria are obtained. pp. 693-702

## STRUCTURED KNOWLEDGE IN THE FRAME OF BAK-SNEPPEN MODELS

Livio Clemente Piccinini, Maria Antonietta Lepellere, Ting Fa Margherita Chang, Luca Iseppi

Instruction aims at the acquisition of a structured or procedural knowledge and was always torn between a frame of imitation of examples (more or less exhaustive) and a frame of theoretical or conceptual knowledge, exposed more or less systematically. Mathematics has the longest history at the level of its phylogeny, since it built in time many alternating systems of consistent relations, even if they clashed when they had to be mixed and glued together. The mathematical evolution of the individual (ontogeny) is subject to sudden jumps unlike the softer evolution of less structured disciplines. The moments of confrontation between different structures or innovation sparks need time to affect the existing structures, both in phylogeny and in ontogeny. Bak-Sneppen models of evolution help to understand many social phenomena, especially when voluntary or random competition may hinder the search of optimal individual paths, but at the same time forces development. In mathematics, because of its high developed structure, knowledge waves can hinder comprehension both of pupils and of scholars. The paper discusses some paradoxes where a greater knowledge has proved to diminish efficiency and capability. pp. 703-718

## HYPERGROUPS AND FUZZY SETS ASSOCIATED MODULO A SUBGROUP

**Rabah Kellil**

This paper is the results of the ideas suggested by P. Corsini in his paper [10]. Our investigations take in account the paper [13] of I. Cristea. We study the hypergroup generated by the cosets modulo a subgroup (normal subgroup). We prove that  $(G/H, \circ_4)$  is a complete hypergroup. We take many particular examples to illustrate some known results on hypergroups. pp. 719-730

## WEAKLY EQUIVALENCE PRESERVING FUNCTORS

**Fatemeh Mohammadi Aghjeh Mashhad**

Let  $R$  be a commutative ring and  $T$  be an additive covariant functor from the category of  $R$ -modules to itself. We recall that an  $R$ -module  $M$  is said to be  $T$ -acyclic (resp.  $T$ -coacyclic) if the  $n$ -th right (resp. left) derived functor of  $T$  on  $M$  is zero for any positive integer  $n$ . Assume that  $T$  is a left (resp. right) exact functor and  $X, Y$  are two bounded to the left (resp. right)  $R$ -complexes of  $T$ -acyclic (resp.  $T$ -coacyclic)  $R$ -modules such that  $X \simeq Y$ . We will show that  $T(X) \simeq T(Y)$ . As an application, we extend the main results of Sazeedeh, Divaani-Aazar and Mohammadi that provide some new ways for computing local (co)homology modules. pp. 731-738

## OLVER'S METHOD FOR SOLVING ROOTS OF $p$ -ADIC POLYNOMIAL EQUATIONS

**Julius Fergy T. Rabago**

Let  $\mathbb{Z}_p[x]$  be the set of all functions whose coefficients are in the field of  $p$ -adic integers  $\mathbb{Z}_p$ . This work considers a problem of finding a root of a polynomial equation  $P(x) = 0$  where  $P(x) \in \mathbb{Z}_p[x]$ . The solution is approximated through an analogue of Olver's method for finding roots of polynomial equations  $P(x) = 0$  in  $\mathbb{Z}_p$ . pp. 739-748

## SOLITONS AND OTHER SOLUTIONS TO NONLINEAR PDEs

**Elsayed M.E. Zayed, S.A. Hoda Ibrahim, Mona E.M. Elshater**

In this article, we apply  $(\frac{G'}{G})$ -expansion method to construct exact traveling wave solutions with parameters of four nonlinear PDEs having non-integer balance numbers, namely, the convection-diffusion-reaction equation with power-law nonlinearity with density-independent (or density-dependent) diffusion, and the generalized KdV-mKdV equation with any order (or with higher-order) nonlinear terms. When the parameters take up special values, the solitary wave solutions as well as the trigonometric and rational function solutions are derived from the exact traveling wave solutions. The used method in this article presents a wider applicability for handling nonlinear wave equations. pp. 749-768

## OSCILLATION OF THIRD-ORDER NONLINEAR NEUTRAL DIFFERENTIAL EQUATIONS WITH DISTRIBUTED TIME DELAY

**Haifei Xiang**

With the development of modern society, research on properties of ordinary differential equation is becoming one of the hotspots in mathematical field. Neutral differential equation which is usually generated in natural science and engineering field is always extensively concerned by many scientific researchers for it can effectively describe multiple complex phenomena in natural world.

In recent years, differential equation and non-linear differential equation with time delay have attracted more and more attention. However, few researches concern about the properties of neutral differential equations with time delay. On account of this, we explored the oscillation of third-order nonlinear neutral delay differential equations. Based on operators and integration techniques and with the help of proper comparison theorem, we established some oscillation sufficient conditions for several new solutions to such kind of equation. The obtained theorem which popularizes and improves results of the existing literature is applicable to neutral differential equations. These results fully reflect the effects of time delay in oscillation of equation. pp. 769-782

## COPROXIMALITY RESULTS IN KÖTHE BOCHNER SPACES

Jameela Jawdat, Sharifa Al-Sharif

As a counterpart to best approximation in normed linear spaces, best coapproximation was introduced by Franchetti and Furi, [3], in 1972. If  $X$  is a Banach space,  $E(X)$  the Köthe Bochner function space and  $G$  is a closed subspace of  $X$ , the problem is: under what conditions the subspace  $E(G)$  is proximal (coproximal) in  $E(X)$ ? In this paper we prove that if  $G$  is a coproximal separable subspace of  $X$ , then  $E(G)$  is coproximal in  $E(X)$ . Some other results are presented. pp. 783-790

## INTUITIONISTIC PERMEABLE VALUES IN BCK/BCI-ALGEBRAS

Seok Zun Song, Young Bae Jun

Intuitionistic permeable values in  $BCK/BCI$ -algebras are introduced, and several properties are investigated. A relation between an intuitionistic permeable S-value and an intuitionistic permeable I-value is discussed. Conditions for the intuitionistic lower (upper) level set to be  $S$ -energetic and I-energetic are considered. Conditions for a couple of numbers to be an intuitionistic permeable S-value are studied. pp. 791-800

## SOME ELEGANT PROOFS IN 2-METRIC SPACE AND G-METRIC SPACE

T. Phaneendra, K. Kumara Swamy

Elegant analytical proofs of some fixed point theorems in 2-metric space and  $G$ -metric space are presented through elementary set theoretical notions of real numbers and repeated use of the rectangle inequality of the  $G$ -metric, without an appeal to iterations. The unique fixed points obtained are shown to be contractive fixed points in these spaces. pp. 801-818

## ANALYTIC SOLUTION FOR RLC CIRCUIT OF NON-INTEGGER ORDER

Jignesh P. Chauhan, Pratik V. Shah, Ranjan K. Jana, Ajay K. Shukla

In this paper, we discuss second order fractional differential equation model for RLC circuit with order  $1 < \alpha \leq 2$  and  $0 < \beta \leq 1$ . Further, we use Laplace transform method including convolution theorem to obtain the solution. pp. 819-826

## IDEMPOTENT ELEMENTS OF PRE-GENERALIZED HYPERSUBSTITUTIONS OF TYPE $(m, n)$

Nareupanat Lekkoksung, Prakit Jampachon

A generalized hypersubstitution of type  $\tau = (m, n)$  is a mapping  $\sigma$  which maps the  $m$ -ary operation symbol  $f$  and  $n$ -ary operation symbol  $g$  to the term  $\sigma(f)$  and  $\sigma(g)$ , and may not preserved arities. Each generalized hypersubstitution can be extended to a mapping  $\hat{\sigma}$  on the set of all terms of type  $\tau = (m, n)$ . The structure  $(\text{Hyp}_{\mathbb{G}}(\tau); \circ_{\mathbb{G}}, \sigma_{\text{id}})$  is a monoid where  $\sigma_{\text{id}}$  is an identity hypersubstitution. A pre-generalized hypersubstitution of type  $\tau = (m, n)$ , namely  $\sigma$ , is a generalized hypersubstitution of type  $\tau = (m, n)$  where  $\sigma(f)$  and  $\sigma(g)$  are not variables. In this paper, we characterize idempotent pre-generalized hypersubstitutions of type  $\tau = (m, n)$ . pp. 827-842

## SOME IDENTITIES FOR DEGENERATE FROBENIUS-EULER NUMBERS ARISING FROM NONLINEAR DIFFERENTIAL EQUATIONS

Taekyun Kim, Dae San Kim, Hyuck-In Kwon, Jong-Jin Seo

In this paper, we derive nonlinear differential equations from the generating function of degenerate Frobenius-Euler numbers which originate from Carlitz degenerate Euler numbers. In addition, we give some explicit identities for degenerate Frobenius-Euler numbers arising from our nonlinear differential equations. pp. 843-850

## **( $\in, \in \vee q$ )-OSMOTIC VALUES WITH APPLICATIONS IN $BCK/BCI$ -ALGEBRAS**

**Kyoung Ja Lee, Young Bae Jun**

The notions of  $(\in, \in \vee q)$ -osmotic S-value and  $(\bar{\in}, \bar{\in} \vee \bar{q})$ -osmotic S-value are introduced, and related properties are investigated. Relations between osmotic S-value and  $(\in, \in \vee q)$ -osmotic S-value ( $(\bar{\in}, \bar{\in} \vee \bar{q})$ -osmotic S-value) are considered. Conditions for a number in the unit interval  $[0, 1]$  to be an osmotic S-value (resp.,  $(\in, \in \vee q)$ -osmotic S-value and  $(\bar{\in}, \bar{\in} \vee \bar{q})$ -osmotic S-value) are provided. Conditions for level sets to be S-energetic set and/or subalgebra are discussed. pp. 851-858

## **FUZZY INTERIOR HYPERIDEALS IN ORDERED SEMIHYPERGROUPS**

**Nuchanat Tipachot, Bundit Pibaljomme**

We introduce the notions of an interior hyperideal and a fuzzy interior hyperideal of an ordered semihypergroup. Then, we present a characterization of an interior hyperideal in terms of fuzzy interior hyperideals. The notion of an intra-regular ordered semihypergroup is introduced. Then, we show that fuzzy interior hyperideals and fuzzy hyperideals coincide in regular ordered semihypergroups and intra-regular ordered semihypergroups. Finally, we give the concept of a simple ordered semihypergroup and characterize simple ordered semihypergroups by means of fuzzy hyperideals and fuzzy interior hyperideals. pp. 859-870

## **ON THE OVERGROUPS OF $SL(1, K)$ IN $GL(r, F)$**

**Xin Hou, Shangzhi Li**

For some pair of division rings  $K$  and  $F$  with  $K \supset F$  and  $\dim_F K = r$ , we want to determine the overgroups of  $K^* = SL(1, K)$  in  $GL(r, F)$  and obtain the maximal subgroups of  $GL(r, F)$ . Let  $R$  stand for real number field,  $C$  for complex one and  $Q$  for the skew-field of quaternions. All the overgroups of  $C^* = SL(1, C)$  in  $GL(2, R)$  and  $Q^* = SL(1, Q)$  in  $GL(2, C)$  are found in this paper. pp. 871-878

## **QUANTUM CONDITIONAL LOGICAL ENTROPY OF DYNAMICAL SYSTEMS**

**Abolfazl Ebrahimzadeh**

In this paper, we will define the notion of conditional logical entropy of dynamical systems on a quantum logic. We will prove some of its properties. The relation between this measure and the notion of logical entropy of quantum dynamical systems which was defined in my paper (Open Physics, 14:1-5, 2016), will be presented. pp. 879-886

## **SOME RESULTS ON $n$ -CAMINA PAIRS OF GROUPS**

**Fatemeh Mahmudi, Ahmad Gholami**

In [6], Lewis found a bound for  $|Z(G)|$  in terms of  $[G : Z(G)]$  where  $(G, Z(G))$  is an Camina pair of groups. In this paper we generalize this concept to  $n$ -Camina pairs of groups with respect to the variety of nilpotent groups of class at most  $n$ , and find a bound for  $\left| \frac{Z_n(G)}{Z_{n-1}(G)} \right|$  where  $(G, Z_n(G))$  is an  $n$ -Camina pair of groups and  $G$  is a finite  $p$ -group. pp. 887-898

## **ON UPPER AND LOWER WEAKLY $\mathcal{I}$ -CONTINUOUS MULTIFUNCTIONS**

**C. Arivazhagi, N. Rajesh**

In this paper, we introduce and study a new generalization of  $\mathcal{I}$ -continuous multifunctions called weakly  $\mathcal{I}$ -continuous multifunctions in topological spaces. pp. 899-912

## GELFAND THEOREM FOR BANACH HYPERALGEBRAS

Rohollah Parvinianzadeh, Ali Taghavi

In this paper, we prove that if  $A$  is a commutative Banach hyperalgebra then the maximal w-hyperideal space of  $A$  is in one-to-one correspondence with the set of (proper) maximal w-hyperideal in  $A$ . Also, we obtain some interesting results in direction. pp. 913-922

## ON ALMOST 2-ABSORBING SUBMODULES

Mohammad Yasein, Rashid Abu-Dawwas

Let  $R$  be a commutative ring with identity and let  $M$  be a unitary  $R$ -module. A proper submodule  $N$  of an  $R$ -module  $M$  will be called almost 2-absorbing submodule if  $a, b \in R$  and  $m \in M$  with  $abm \in N - (N : M)N$  implies that  $ab \in (N : M)$  or  $am \in N$ , or  $bm \in N$ . Also a proper ideal  $I$  of  $R$  will be called almost 2-absorbing ideal if  $a, b, c \in R$  with  $abc \in I - I^2$  implies that  $ab \in I$  or  $ac \in I$ , or  $bc \in I$ . These concepts are generalizations of the notions of 2-absorbing submodules and ideals respectively, which have been studied. In this paper we give several results concerning almost 2-absorbing submodules. pp. 923-928

## KUPY-NEEV HASH FUNCTION

Khushboo Bussi, Dhananjay Dey, Manoj Kumar, B.K. Dass

Kupyna has been approved as a new cryptographic standard hash function of Ukrain in 2015 (Ukrainian standard DSTU 7564:2014). It is built on the transformations of Kalyna block cipher (Ukrainian standard DSTU 7624:2014). The design of compression function of Kupyna is nearly identical with Grøstl that makes it vulnerable to the similar attacks those were introduced on Grøstl. It is adapted for its highly secured design and its efficiency but lately Mendel et al. [4] and Zou et al. [14] mounted rebound attack on compression function of Kupyna-256 and reduced round collision attack on Kupyna hash function respectively. These attacks are applied on Kupyna because of its permutations based on AES. In this paper we propose Kupy-Neev hash function in which we change those permutations with the permutations based on *Neeva Hash* [1]. pp. 929-944

## DYNAMIC BEHAVIOR OF TRAVELING WAVE SOLUTIONS FOR A CLASS FOR THE TIME-SPACE COUPLED FRACTIONAL kdV SYSTEM WITH TIME-DEPENDENT COEFFICIENTS

H.M. Jaradat

In this paper, a simplified bilinear method combined with a fractional transform has been used to obtain a new multiple soliton solutions for the Fractional coupled fractional kdV equations with variable coefficients. These systems appear in biology, engineering, mechanics, complex physics phenomena economics, signal image processing, notably control theory, groundwater problems and chemistry. Dispersion relations on the effects of the inhomogeneities of the model "due to the variable coefficients" are derived and interpreted for deterministic of the characteristic-line and velocity of each obtained soliton waves. pp. 945-958

## THE SOLUTIONS OF PAULI EQUATION IN DE SITTER SPACE BACKGROUND AND HOMOGENEOUS MANIFOLD $SU(2)/U(1)$

F. Safari, H. Jafari, J. Sadeghi

In this paper, we consider a particle with spin  $\frac{1}{2}$  in de Sitter space-time. Procedure for transition to the Pauli approximation is conducted in the equation in the variable  $(t, r)$ , obtained after separating the angular dependence of  $(\theta, \varphi)$  from the wave function. We make the suitable second order equation corresponding to de Sitter space time for particle spine  $\frac{1}{2}$  we then compare this equation to Jacobi polynomial and obtain the wave function and eigenvalues (energy spectrum) which is important for the corresponding system. Also, by taking the advantage from weight and main function in Jacobi polynomial and obtain the corresponding algebra. pp. 959-964



## ON MARGINAL AUTOMORPHISM OF INFINITE GROUPS

Masumeh Khademi, Ahmad Gholami

Let  $W$  be a non-empty subset of a free group and  $G$  be any group. An automorphism  $\alpha$  of  $G$  is called marginal automorphism if  $g^{-1}\alpha(g) \in W^*(G)$  for any  $g \in G$  where  $W^*(G)$  is marginal subgroup of  $G$ . In this paper we study some properties of marginal automorphism of infinite group  $G$ . pp. 965-974

## ON THE ORDER AND LOWER ORDER OF LAPLACE-STIELTJES TRANSFORMATIONS WITH INDEX PAIR $(p, q)$

G.S. Srivastava, Chhaya Singhal

In this paper, in order to study the precise growth of entire functions represented by Laplace-Stieltjes transformations, we have introduced the concept of  $(p, q)$ -order and lower  $(p, q)$ -order and obtained their coefficient characterizations. pp. 975-986