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ABOUT THE DIOPHANTINE EQUATIONS (I)
Gheorghe M. TUDOR, Mihai NEAGU

Abstract. In this paper it will be given some solutions (x, y, z) in natural numbers or in positive rational numbers for the Diophantine equations $x^{y^{\alpha}} \cdot y^{x^{\alpha}} = z^{z^{\alpha}}$ (for $\alpha = 1$ and for $\alpha = -1$).

Keywords: Diophantine equation.

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AN ELEMENTARY INTEGRAL FOR SET-VALUED FUNCTIONS

Octavian LIPOVAN

Abstract. This paper presents a study of some of the structure associated with one elementary integral of set valued functions and shows that under suitable assumptions, it possesses fairly good properties. In particular we indicate dominated convergence and completeness results in a general setting. This approach of the integral is made in terms of submeasures and associated topological rings.

Keywords: topological rings.

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THE INFRATRIGONOMETRY, AN INFERIOR ORDER NEIGHBORHOOD DOMAIN
OF TRANSTRIGONOMETRY

Malvina BAICA, Mircea CARDU

Abstract. In this paper we apply the formulas for the basic functions of Transtrigonometry [3] for one of its adjacent domain of inferior order ($0 \leq k < 1$). We will analyze the particularities of these basic functions characteristics in this domain which we named Infratrigonometry.

Keywords: Transtrigonometry, Special trigonometric functions.

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SOME APPROXIMATION THEOREMS FOR BERNSTEIN POLYNOMIALS OF TWO VARIABLES ON A TRIANGLE

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Abstract. In this paper we will give the approximation theorems for Bernstein polynomials of two variables on a triangle.

Keywords: Linear positive operators, Bernsteinbivariate polynomials, approximation formula.

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THE ULTRATRIGONOMETRY, A SUPERIOR ORDER ADJACENT DOMAIN OF TRANSTRIGONOMETRY

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Abstract. In a previous paper regarding the Infratrigonometry (IT) [3], we performed an analysis about some basic elements of the Transtrigonometry (TT) [2] extended to its inferior domain in function of the order values k. Thus, if for TT, k has values in the domain $1 < k < 2$, for IT the order k has values in the domain $0 \leq k < 1$.

In this paper we perform the analysis of another adjacent to TT domain, this time of a superior order namely for $2 < k \leq \infty$. We call this domain „Ultratrigonometry" (UT). For this domain we will point out its particular characteristics for the basic functions in this Trigonometry.

Keywords: Ultratrigonometry, Transtrigonometry, Infratrigonometry, Special trigonometric functions.

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NONCOMMUTATIVE FINITE SYSTEMS OF GRAMIAN ISOMETRIES AND APPLICATIONS

Tudor BINZAR, Loredana CIURDARIU

Abstract. Using a Wold-type decomposition for noncommutative finite systems of gramian isometries on Loynes spaces , a characterization of gramianconstant inner operators associated with such systems ins given.

Keywords: gramianconstant inner operators.

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ANALYSIS OF THE RECONNECTION PROCESS IN NONTWIST CUBIC MAPS

Gheorghe ȚIGAN

Abstract. The reconnection process in the dynamics of cubic nontwist maps, introduced in [7], is studied. The paper extends the results presented in [14]. Namely, we study the local and global bifurcations related to reconnection, following a one dimensional section in the parametric space associated to a nontwist cubic Hamiltonian system..

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A CHARACTERIZATION OF SUBNORMALITY FOR LINEAR BOUNDED OPERATORS ON LOYNES SPACES

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Abstract. In this paper a Halmos-Bram criterion for linear bounded operators on Loynes spaces that admit adjoint is proved.

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Physics

THE QUANTUM STATISTICS OF THE CHEMICAL REACTIVITY. PART IV: MAGNETIC AND ELECTRIC ATOMIC PROPERTIES DERIVED FROM ATOMIC RADII

Mihai V. PUTZ

Abstract: Based of the atomic radii density functional scale the magnetic susceptibility and static polarizability of isolated atoms are analytically developed in terms of outer shell atomic properties. It follows that the associate elemental scales display the suitable periodical shapes respecting the experimental first ionization potentials being therefore reliable when iterative molecular information are extracted from the atomic levels.

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THE ABSORPTION OF THE UNPOLARIZED MONO-CHROMATIC ELECTROMAGNETIC RADIATION BY A VERY DILUTED FERROFLUID

Ioan LUMINOSU

Abstract: The FP10 ferrofluid is prepared using the chemical precipitation method. The dispersant is the oil and the stabilizer is the oleine. The average diameter of the magnetite particles is 11.354 nm. The absorption of the electromagnetic mono-chromatic radiation is determined using the SPECORD UV - VIS spectrophotometer.

This work proposes an optical method based on the statistical interpretation of the experimental data regarding the spectral absorption of the electromagnetic radiation by the FP10 ferrofluid in order to estimate the average diameter of the ferrofluid aggregates.

The optical method allowed the estimation that the average diameter of the aggregates from the very diluted solutions of the FP10 ferrofluid is of about 4 nm and the average number of particles in an aggregate is 4. The diluted solutions of the FP10 ferrofluid are stable and their use in technical applications is convenient.

Key words: absorption, biphasic, colloidal, extinction, mono-chromatic, spectrophotometer.

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POLYETHYLENE AS LIGHT AMPLIFIER

Jevrem D.JANJIC, Bratislav S. TOSIC

Abstract: It was experimentally found thet the polyethylene foil noticeably amplifies intensity of light, and that amplification is proportional to the foil thickness. It was separated seven lines from mercury lamp and every of them was amplified. This relatively high number of lines can be explained, most probably, by the presence of impurities. Light amplifying is the consequence of simultaneous transition big groups of electrons from higher to some lower energy level. Monomers of olyethylene have not sufficient number of levels to explain seven amplified lines. It was reason to formulate a model of polyethylene as sistem of weakly interacting parallel linear chains with about fifty monomers per chain. The collective electron energy levels of the chain make a "stairway" for electron transitions from higher to lower levels. By means of this model experimental data were reprodeced with exactness up to one percent.

Keywords: light amplification, polyethylene, inverse population, coherent photons

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ANALYSIS OF THE CLASSICAL SHIFT DOPPLER FORMULAS
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Address: In this paper we establish the shift Doppler formulas for all cases of relative motion of the source and of the receiver . Both the source and the receiver can be at rest or in motion.
Keywords: shift Doppler
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MODELING OF QUANTUM SEMICONDUCTOR
VIA THE TRANSFER MATRIX METHOD
Marius PAULESCU, Eugenia TULCAN-PAULESCU, Paul GRAVILA

Abstract. This paper reviews the transfer matrix method for computing the transmittance coefficient for an arbitrarily sequence of rectangular potential barriers. The numerical model, implemented in our simulation system SQS, is appropriate to compute different semiconductor devices. The examples presented argue for the elegance, simplicity and feasibility of the method.
Keywords: quantum semiconductor
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SOME ASPECTS OF IR ABSORPTION IN THE
ISOMORPHOUS Me_2O_3 TERNARY SISTEM
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Abstract. The experimental results concerning the infrared absorption spectra (400-4000 cm^{-1}) of samples with 30% mol α-Fe_2O_3 from the isostructural oxides α-Fe_2O_3, α-Cr_2O_3, α-Al_2O_3 ternary system are presented and discussed. The IR spectra were obtained by using powdered samples tablet formed with KBr, at room temperature. Some investigated samples are solid solutions and the others contain two phases and these belong to gap miscibility from the ternary system. All spectra exhibit two absorption bands below 700 cm^{-1} that are larger for samples from gap miscibility.
Keywords: IR absorbtion, infrared spectra
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