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Mathematics

THINWALLED PANEL FINITE ELEMENTS IN SHEARING STRESS ANALYSIS OF THIN WALLED BEAM-TYPE

Josip BRNIĆ, Marko ČANADIJA, Domagoj LANC, Goran VUKELIĆ

Abstract. As it is known exist many types of engineering structures. According to the modern design, e.g. using computer procedure, as well as to the requirement of low prices, the optimal structure design will be reached using an iterative numerical procedure. Between mentioned type of structures, very often thin walled beam-type structures are those that come into the consideration. In this paper a very powerful tool for shearing stress analysis of thin walled beams is given and for justification some examples are shown.

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SOME REMARKS ABOUT NUMERICAL INTEGRABILITY ON THE HEISENBERG LIE GROUP H(4) (I)

Anania ARON, Camelia ARIEŞANU

Abstract. The goal of our paper is to make a comparison between two numerical integrators and to point out their properties on the Lie group H(4).

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SUPERDENSE POINTWISE UNBOUNDED DIVERGENCE WITH RESPECT TO STURM-LIOUVILLE NODE MATRICES

Alexandru I. MITREA

Abstract. The main result of this paper refers to the topological structure of the set of unbounded divergence of some interpolating operators related to a problem of Sturm-Liouville type.

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REGARDING THE PARATRIGONOMETRIC EQUATION OF THE CIRCLE

Malvina BAICA, Mircea CÂRDU

Abstract. In this paper the authors establish empirical relations, for each individual quadrant, of the four trigonometric circle quarters (of radius R=1). These four relations (referring on a coordinates system Ox-Oy with the axis
Ox and Oy tangent at the circle) together, can replace the known classical equation of trigonometric circle (referring on a coordinates system Ox-Oy with the origin in the center of the circle).

Keywords and phrases: Classical Trigonometry, Paratrigonometry.

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APPROXIMATION MODELS AND ALGORITHMS BASED ON NEURAL NETWORKS

Nicolae POPOVICIU

Abstract. The work gives a description of exact models and approximation models. The third case is based on neural networks with radial basis function approach.


ON EXPONENTIAL TRICHOTOMY OF SEMIGROUPS OF LINEAR OPERATORS

Mihail MEGAN and Larisa BULIGA

Abstract. The aim of this paper is to give necessary and sufficient conditions for exponential trichotomy of semigroups of linear operators.

Keywords and phrases: semigroup of linear operators, exponential trichotomy.

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ON BACKWARD DIFFERENTIAL EQUATIONS BY MCSHANE TYPE

Romeo NEGREA, Horia CÂRSTEA

Abstract. In this paper we shall establish a new theorem on the existence and uniqueness of the adapted solution to a backward stochastic differential equation by McShane type under some weaker conditions that the Lipschitz one. The motivation for the study is a similar Black-Scholes type model in mathematical finance and the control of an electronic circuits with stochastic resonance.

Keywords and phrases: belated integrals, McShane stochastic differential equations, backward stochastic differential equations, financial modeling, stochastic resonance.

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ON SOME NEW GENERALIZATIONS OF CARLSON’S INEQUALITIES

Emil C. POPA

Abstract. We give some generalizations of Carlson’s inequalities and a related result.

Keywords and phrases: Carlson inequality, Holder inequality, Minkowski inequality.
SOME CLASSES OF BRANDT GROUPOIDS

Vasile POPUȚA

Abstract. In this paper some types of Brandt Groupoids are given and some of their properties are studied. Particularly, the Cryptographic Groupoid is obtained.

Keywords and phrases: groupoid, groupoid of type \((p, q)\) over a ring, cryptographic groupoid, opposite of groupoid, kernel, inner morphism, inner automorphism.

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JAVA FOR APPROXIMATING A SHIP’S CROSS SECTION

Camelia CIOBANU, Marian CATĂ, Arlette-Rabela ANGHEL

Abstract. The ship hull form have been described by the well-known classic Lewis transformation, Lewis [6] in 1929, and by an Extended-Lewis transformation with three parameters, as given by Athanassoulis and Loukakis [1] in 1985, with practical applicability for any types of ships. We present here an algorithmic method solving directly the problems that appear in naval architecture domain concerning the contour of ship’s cross-section. The application was made in Java language and creates both a text file and a graphical chart.

Keywords and phrases: hydrodynamic, ship cross section, Lewis transformation, area of the cross section.

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RELATIVELY INERTIAL DELAYS

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Abstract. The paper studies the relatively inertial delays that represent one of the most important concepts in the modeling of the asynchronous circuits.

Keywords and phrases: delay, asynchronous circuit, relative inertia.

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ALMOST PERIODIC MULTIFUNCTIONS WITH VALUES IN GENERALIZED UNIFORM SPACES

Nicolae CRIVĂȚ

Abstract. For multifunctions with values in generalized uniform spaces the almost periodicity is defined. Some properties of such multifunction and relationships between almost periodicity and uniform continuity are given.
ALGORITHM FOR NUMERICAL SOLUTION OF
HIGHER ORDER POISSON EQUATIONS

Pavel NĂSLĂU

Abstract. In this paper we give an algorithm for numerical solution of the mixed problem for higher order Poisson equations following a generalization of direct boundary element method to this problem.

Keywords and phrases: higher order Poisson equations, mixed problem, direct boundary element method, algorithm.

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Physics

LAMELLAR NON – IMAGING CONCENTRATOR WITH DIEDRAL ANGLE

Ioan LUMINOSU

Abstract. The lamellar non – imaging concentrator with diedral angle which is graphically designed. The concentrator uses polyester lamellas on which a layer of aluminium is placed by a process of vacuum evaporation.

The reflected surface has an area of $A_R = 2968 \text{ cm}^2$ while the area of the aperture is $A_p = 1225 \text{ cm}^2$. The concentrator factor has a value of 5.4.

The efficiency of the mirror up to reaching a temperature of 120° C is 0.29.

Keywords: non – imaging, concentrator, diedral angle, truncated pyramid.

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THE EVALUATION OF THE POSSIBLE PHYSICAL DIMENSIONS OF THE LARGE NATURAL KUIPER BELT OBJECTS(PLANETOIDS) BEYOND PLUTO

Zoran B. Todorović

Abstract. The possible orbits beyond Pluto have been constructed in terms of Pluto’s parameters and the fine structure constant. The evaluations of the possible physical dimensions of large new discovered planetoids (2003US2, 2009GU9, 2001KX76, 2002UX25, 2002TX300, 2002WR106, 2002LM60, 2002AW197, 2001UR163, 2002TC302, 2003VB12) within the Classical Kuiper belt, has been made. Using proposed theoretical approach have been fitted Sedna’s diameter and its semimajor axis with respect to its location. The space beyond Pluto is parted into several clusters with equal length has been shown. It seems that Pluto is not a planet of Solar system, while it naturally belongs to the Kuiper belt objects.

Keywords: solar system, planetary orbits, Kuiper belt objects, fine structure constant.

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A CRITICAL VIEW CONCERNING IMAGE ERECTORS

Marius COSTACHE, Corina GRUESCU

Abstract. The paper describes basic optical assemblies used to erect image and defines quality criteria. Two types of prismatic erectors and three types of lens erectors are studied as alternatives for a complex optical system needing erect final image. The alternatives and the criteria are mathematically analyzed using software Electre III. The final ranking provided by the program allows the user to make the best choice.

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IR ABSORPTION IN THE TERNARY SYSTEM OF ISOMORPHOUS $\text{Me}_2\text{O}_3$ OXIDES

Minerva CRISTEA, Viorel CHIRITOIU, Marius COSTACHE

Abstract. The experimental results concerning the infrared absorption spectra (400-4000 cm$^{-1}$) of samples with 50% mol $\alpha$-Fe$_2$O$_3$ from the isostructural oxides $\alpha$-Fe$_2$O$_3$, $\alpha$-Cr$_2$O$_3$, $\alpha$-Al$_2$O$_3$ 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.

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OPTICAL AND ELECTRICAL MODELING OF MULTIPLE QUANTUM WELL SOLAR CELLS

Marius PAULESCU, Paul GRAVILA, Eugenia TULCAN-PAULESCU

Abstract. This paper surveys a new concept of photovoltaic converters that are subject of nanoscale science: Multiple-Quantum-Well (MQW) solar cells. We propose a simplified but accurate theoretical model of absorption coefficient for direct bandgap III-V alloys as starting point of MQW optical modeling. A model of MQW solar cell in p-i-n architecture is derived inside detailed balance theory. Using this model, the dependence of the cell performance on the number of wells, barrier composition and the effect of i-region thickness can be investigated. As an example, the estimate of the maximum efficiency that can be achieved for a proposed architecture is given.

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