

BULETINUL ȘTIINȚIFIC
al Universității “Politehnica” din Timișoara, Romania
SCIENTIFIC BULLETIN OF
“Politehnica” University of Timișoara, Romania

Contents and abstracts

Seria MATEMATICĂ - FIZICĂ
Transactions on MATHEMATICS & PHYSICS
Tom 56(70), Fascicola 1, 2011, ISSN 1224-6069

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Mathematics

OPTIMIZATION PROBLEMS, FIRST ORDER APPROXIMATED OPTIMIZATION PROBLEMS, DUALS AND THE CONNECTIONS BETWEEN THEIR SADDLE POINTS

Emilia Loredana POP and Dorel I. DUCA

Abstract. In this paper, we attach to the optimization problem (P); $(0; 1)$ η - approximated optimization problem (AP). We will study the connections between the saddle points of Problem (P); (AP) and of their duals (D); (DAP)

Keywords: optimal solution, saddle point, optimization problem, dual of Problem (P), $(0; 1)$ - η - approximated optimization problem, dual of Problem (AP).

MSC (2010): 90C26; 90C30; 90C46

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INTEGRATION BY ELLIPTIC FUNCTIONS OF GENERAL EULER TOP SYSTEM

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Abstract. The main purpose of this paper is to discuss the integration of the general Euler top system via the elliptic functions.

Keywords: Euler top system, integration, elliptic functions
MSC (2008): 26A33, 65L07

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A NOTE ON THE RELATIVE COHOMOLOGY OF COMPLEX MANIFOLDS

Cristian IDA

Abstract. In this paper we define a relative Dolbeault cohomology of complex manifolds and we prove a related Dolbeault type Lemma. We also define the products in this relative cohomology and we study an associated Lusternik-Schnirelmann category and nilpotency. Finally, in the Kählerian case, we prove a relative $\partial \bar{\partial}$ type Lemma.

Keywords: complex manifolds, relative Dolbeault cohomology.
MSC (2010): 32C15, 32C35

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THE GENERALIZED HYERS-ULAM STABILITY FOR A CLASS OF THE VOLTERRA NONLINEAR INTEGRAL EQUATIONS

Liviu CĂDARIU

Abstract. The aim of this paper is to study the generalized Hyers-Ulam stability for a class of the Volterra nonlinear integral equations, by using the weighted space method. Our main theorem generalize and extend some recent results given in this field. A partially answer to the open problem of M. Gachpazan & O. Baghani [14] it is also obtained.

Keywords: Generalized Hyers-Ulam stability, Volterra nonlinear integral equation, Weighted space method.

MSC (2010): 39B62,39B72,39B82,47H09

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STABILITY OF THE SOLUTION FOR A GENERALIZED NONLINEAR VARIATIONAL INEQUALITY

Daniela INOAN

Abstract. We consider a family (depending on a parameter) of generalized variational inequalities, governed by nonlinear, set-valued functions defined on a reflexive Banach space.

The main result concerns the behavior of the solution, giving sufficient conditions for the stability of the initial variational inequality problem under small perturbations of the parameter.

Keywords: variational inequalities, stability with respect to perturbations

MSC (2010): 49J40, 49K40, 47J20

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PERTURBATION OF K-FRAMES

Laura GĂVRUȚA

Abstract. In the present paper we will give a survey on new results and properties related to K-frames and families of local atoms considered in the papers [8] and [9]. We also give two results concerning perturbation of K-frames and families of local atoms.

Mathematics Subject Classification (2010): 42C15, 47A63

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THE VOLUME ENTROPY OF A RIEMANNIAN METRIC EVOLVING BY THE RICCI FLOW ON A MANIFOLD OF DIMENSION 3 OR ABOVE

Cătălin C. VASII

Abstract. In this paper it is proven that the volume entropy of a Riemannian metric evolving by the Ricci flow, if the metric does not collapse, nondecreases. Therefore it provides a sufficient condition for a solution to collapse. Then, for the limit solutions, the limit entropy is the limit of the entropy as t approaches the singular (finite or not) time. As a corollary, if the volume entropy decreases, the solution collapses along topologically nontrivial geodesic loops.

MSC (2010): 58j35; 37B40

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FORMAL ANALOGY BETWEEN TWO-DIMENSIONAL MAGNETIC AND ELECTRIC FIELD REFRACTIONS IN ISOTROPIC MATERIALS WITH PERMANENT MAGNETIZATION / POLARIZATION

Ioan BERE

Abstract. This paper is a continuation of the papers [3], [4], [5], [6] and analyze the formal analogy of the relations describing the refraction of 2D magnetic field in isotropic materials with permanent magnetization and relations describing the refraction of 2D electric field in isotropic materials with permanent polarization. The problem of refraction in materials with permanent magnetization / polarization is addressed in two ways: with usual physical quantities in the literature, respectively with new calculation quantities defined by the author.

Keywords: permanent magnetization / polarization, refraction, formal analogy

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INFLUENCE OF THE GEOMETRIC AND HYDRODYNAMIC PARAMETERS ON THE TORQUE CONVERTER PERFORMANCES

Mircea BARGLAZAN , Adriana Sida MANEA, Daniel Catalin STROITA

Abstract: The paper presents a hydraulic analysis of a hydrodynamic torque converter, which equip a testing rig from the Laboratory of Hydraulic Machines of the “Politehnica” University of Timisoara, Romania. Introduction gives an overall picture about the torque converters. Characteristic features present the important fundamental parameters which evaluate the quality of torque converter’s operation through its steady characteristics curves. The flow in the torque converter is analysed from theoretical, numerical and experimental points of view. The researches show the influence of the operation parameters on the torque converter performances. Especially the specific speed and the pump impeller blades angles, turbine runner blades entrance and exit angles and stator blades angles are investigated. The issue puts in evidence the influence of the geometry of the hydraulic circuit of the torque converter on the mechanical qualities of the machine.

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OPTICAL MICROMETER: MEASURING SYSTEM WITH A POLYGONAL SCANNING HEAD

Flavius ANDRAS, Mirela NICOLOV, Virgil-Florin DUMA*

Abstract. The experimental study of an optical system used for non-contact, fast and accurate dimensional measurements is presented. This “optical micrometer” has a polygon scanner mounted eccentric with regard to the optical axis of the telescope that has the space to place the objects to be measured in-between its lenses. The optoelectronics of the setup were built, including a potentiometer to vary the scan frequency and speed of the system. The entire system was calibrated using a set of cylindrical pieces with their diameters determined previously. The calibration parameters, in terms of input voltage (adjusted with the potentiometer), rotating speed, and scan frequency are given. The experimental proof of the good linear dependence between the dimension of the probes and the obscuration time which is the output of the system (the time the photo-detector does not received an optical system as the incoming laser beam is stopped by the object to be measured) concludes the study.

Keywords: Optical system for lasers, Applications of lasers, Optical devices elements, Optical design, Optical scanners, Optical sensors.

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WAVELET THEORY APPLIED TO BIOPHYSICAL SIGNALS

Beatrice ARVINTI, Alexandru ISAR, Dumitru TOADER, Marius COSTACHE

Abstract: The paper presents a practical application of wavelet theory in the domain of biomedical engineering. Wavelet transforms are often replacing the classical Fourier transforms due to their time-frequency localization properties. The mathematical bases concerning wavelets are described and tested on real biophysical signals.

Keywords: wavelets, Heisenberg's uncertainty theorem, electrocardiogram

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FEM MODELLING OF THE MAGNETIC FIELD IN THE AIR GAP OF WEISS ELECTROMAGNET

Daniela VESA

Abstract. In order to choose the dimensions of ferrofluid sample in Quincke's experiment is necessary to know the field distribution in the Weiss electromagnet air gap. For this reason, in the present paper the air gap magnetic field was determined using 3D FEM modelling.

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FORECASTING THE STATE OF THE SKY IN TIMISOARA, ROMANIA. PRELIMINARY RESULTS

Angel PACURAR, Nicolina POP, Marius PAULESCU

Abstract: The paper focuses on forecasting the sunshine number, a Boolean random parameter stating whether the sun is covered or not by clouds. The series of sunshine number may be described by an ARIMA(1,1,1) model while the series of 10-minutes averaged sunshine number may be described by an ARIMA(0,1,1) model. Supplementary assumptions are necessary to maintain the forecasted values in the appropriate range, i.e. $\{0,1\}$ for the sunshine number series and $[0,1]$ for the 10-minutes averaged sunshine number. Global and diffuse solar irradiance recorded at 15-seconds lag between sunrise and sunset during July 2010 in the Romanian town of Timisoara are used to infer and to test the models.

Keywords: sunshine number, solar irradiance, ARIMA model

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DAILY GLOBAL SOLAR IRRADIATION FROM AIR TEMPERATURE DATA

Remus Ștefan BOATĂ

Abstract: In this paper the Takagi-Sugeno fuzzy approach is applied to estimate daily global solar irradiation via air temperature data. A critical assessment of the model performance and limitations is conducted. The modeling procedure, even if it is established on hand of data provided by one station, can be adapted for developing similar models for other locations.

Keywords: solar irradiation, Takagi-Sugeno fuzzy models, air temperature.

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NUMERICAL MODEL TO CALCULATE THE MAGNETIC FIELD IN A HELICAL TURN

Iulia CĂTA, Dumitru TOADER

Abstract: The paper presents a numerical model that calculates the magnetic field produced by current which going through a helical turn, considering the conductor section of which is made the turn. The magnetic field was determined to helical turn considering linear and homogeneous medium using the Vector Field Opera software package in finite element, and the results were compared with those in which it was considered filamentary turn, model implemented in Wolfram Mathematica software package.

Keywords: magnetic field, helical turn, numeric models, finite element method.

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