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### MATHEMATICS

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## THE PARATRIGONOMETRY AND SOME OF ITS SPECIFIC SYMMETRIES
### Malvina BAICA , Mircea CARDU

**Abstract**. In this paper the authors provide a systematisation of all nonconventional trigonometries, other than the Classical Trigonometry (CT) [7], considering that these are: Quadratic Trigonometry (QT) [1], Polygonal Trigonometry (PT) [6], Transtrigonometry (TT) [3], Infratrigonometry (IT) [4] and Ultratrigonometry (UT) [5]. We adopt this generic denomination of Paratrigonometry (PRT) which includes these mentioned nonconventional trigonometries, as well as the Classical (conventional) Trigonometry (CT).
Also, we will analyse some symmetric situations for the functions which represent mathematical modelling of the basic trigonometric figures of Paratrigonometry (as well as "Trigonometric circle" of CT, for example).
**Keywords:** Nonconventional trigonometries, Paratrigonometry, Symmetric functions.

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## ON THE HYERS-ULAM STABILITY OF PARSEVAL FRAMES
### Pasc GĂVRUTA, Loredana CIURDARIU, Laura GĂVRUTA

**Abstract**. We give three results on the stability in the Hyers_Ulam sense of Parseval frames. Our results are strongly related to a recently result of P.G.Casazza [2].
**Keywords:** Parseval frames, Hyers-Ulam stability
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## ON THE LEBESQUE DECOMPOSITION FOR PROBABILISTIC MULTIVALUED MEASURES
### Octavian LIPOVAN

**Abstract**. The main aim of this paper is to study the notion of non-atomic and purely atomic probabilistic multivalued measures. We thus obtain the Lebesgue decomposition theorem for absolutely continuous probabilistic multivalued measures.
**Keywords:** non-atomic and purely atomic probabilistic.

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# ON EXPONENTIAL TRICHOTOMY FOR DISCRETE TIME SKEW-EVOLLUTION SEMIFLOWS IN BANACH SPACES

## Mihail MEGAN, Codruta STOICA

**Abstract.** In this paper we define the notion of discrete time skew-evolution semiflow in Banach spaces. A unified treatment for some uniform asymptotic behaviours, as exponential growth, exponential trichotomy for the property of trichotomy is provided. An equivalent definition and a characterization for the property of trichotomy by means of two projection families is also given.

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**Codruta STOICA,** "Aurel Vlaicu" University of Arad, Departament of Mathematics; Arad, ROMANIA; E-mail: stoicad@rdslink.ro

# SOLUTION STRATEGIES FOR NONLINEAR COUPLED THERMOMECHANICAL PROBLEMS

## Marko CANADIJA, Josip BRNIC

**Abstract.** The paper gives insight into procedures used to deal with nonlinear character of coupled thermomechanical problems. Decoupling technique, finite element model and consistent tangent operators are particularly analysed. Some details of finite strain thermoplasticity are presented. Proposed model is verified by means of a standard academic example.

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# FE  STABILITY ANALYSIS OF ELASTIC FRAMES ACCOUNTING FOR CONNECTIONS FLEXIBILITY

## Goran TURKALJ, Goran VIZENTIN, Domagoj LANC

**Abstract**. Flexible connections and their influence on the elastic buckling load value of frame structures are considered. A numerical approach based upon FE

method is presented. Equilibrium equations of a buckled beam member are derived applying linearized virtual work principle. Connection stiffness is taken into account by modifying conventional stiffness matrices, thus obtaining a hybrid beam element which enables the integration of flexible connections in stability analysis. Stability analysis is treated as an eigenvalue problem.

**Keywords:** frame structure, stiffness matrices, eigenvalue problem.

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# HOPF BIFURCATION ANALYSIS OF THE GROWTH MODEL WITH DELAY
## Olivia BUNDĂU

**Abstract.** In this paper, we study Hopf bifurcation of a growth of a model in which production occurs with delay while new capital is installed (time-to build), considering the case when the delay kernel for a capital is Dirac distribution. The time-to-build technology is shown to yield a system of differential functional equations with a unique steady state. We demonstrate that the steady state exhibits the Hopf bifurcation and we determine the direction and stability of the bifurcating periodic solutions by applying the normal form theory and the center manifold theorem. An example for justifying the theoretical results is also given.

**Keywords:** Growth model, Optimality, Hopf cycles.

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# SOME REMARKS ON A NONLINEAR CONTROL SYSTEM ON SO(4)

## Anania ARON, Camelia POP, Mircea PUTA, Paul SUSOI

**Abstract.** An optimal control problem on the Lie group SO(4) is discussed and some of its properties are pointed out.

**Keywords**: Optimal control, spectral stability, nonlinear stability.

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# A GENERAL FIXED POINT METHOD FOR THE STABILITY OF JENSEN FUNCTIONAL EQUATION

## Liviu CĂDARIU, Viorel RADU

**Abstract.** The aim of this paper is to obtain generalized stability results in the Ulam-Hyers sense for Jensen functional equation. To prove these results a fixed point theorem for generalized contractions is used.

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# A COUNTEREXAMPLE TO A THEOREM OF LYAPUNOV

## Anania ARON, Stefan NICOARĂ, Mircea PUTA

**Abstract.** We give a new counterexample to a well known theorem of Lyapunov.

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# SOME ANALYTICAL MANIFOLDS WITH INDEFINITE METRICS, III
## Nicolae BOJA

**Abstract**. In this paper, the third part of the survey on analytical manifolds of constant sectional curvature of pseudo-Riemannian type, a metric structure and also an analytical manifold structure on some non-Euclidean spaces are presented.

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# MODELLING ELEMENTS FOR THE AUXILIARY SYSTEMS
# WHICH WORKS ON ROAD VEHICLE
## Liviu MIHON

**Abstract.** The paper presents some research and studies in the domain of ABS working conditions starting from the general balance equation of moving and taking in consideration different linearization methods of this equation. The mathematical model is verified with Simulink software and the exploitation curves in the driving cycle are taking in consideration. On example for an automatic regulator system is presented.

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## MEDICAL IMAGE DIGITALIZATION AND ARCHIVING INFORMATION SYSTEM IN SERBIA

### Vjekoslav SAJFERT , Vladimir MILIĆEVIĆ, Vesna JEVTIĆ

**Abstract**: The paper gives a brief presentation of digital and archiving imaging system (PACS) with a survey of the main characteristics and development of the system worldwide as well as the possibilities and the area of its implementation in our conditions. We have given a proposition for digitalization and archiving of both the existing and future medical imaging in accordance with our possibilities for world standards implementation
**Keywords:** Medical imaging, PACS Serbia.
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## THEORY OF THE ORIGIN OF THE ELECTRON
### Zoran TODOROVIC

**Abstract**: Quantum-mechanical theory of the possible origin of the electron has been derived with reliable working formulae, which describe the concrete physical characteristics of the electron.
**Keywords:** quantum theory
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## THEORY OF THE ELECTRON AS A COMPOSITE PARTICLE
### Zoran TODOROVIC

**Abstract:** On the basis of derived modified quantum commutation relations for sub-spins have been shown that electron could be a composite particle. Applying quantum commutators has been calculated fractal size of each sub-particle which build the internal structure of the electron.
**Keywords:** electron, quantum physics
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## IDEAS OF SPACE
### Peter G. O. FREUND

**Abstract.** The evolution of our concept of space is traced from its beginnings when space was viewed as a given, unalterable three-dimensional "container" of

physical phenomena, to the current view inspired by string theory, in which space of a predictable dimensionality emerges from the dynamics of the string. This modern concept does not share the fundamental nature of the old concept, and in fact is only meaningful as long as we do not probe extremely small distances. Moreover, it turns out that two spaces which do not even have the same dimension can nevertheless describe the same physics, even though the force of gravity is present in the higher-dimensional space, while it is surprisingly absent in the lower-dimensional space.

**Keywords:** concept of space

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# ZOOM ERECTORS IN MEASURING APPARATUSES SCHEMES

## Corina GRUESCU, Marius COSTACHE

**Abstract:** The paper describes the design and analytical methods of measuring apparatuses which work with finite object distance and contain image erectors. Aiming at a constant value microscope's magnification, the authors suggest the use of a zoom aphocal erector. The calculus provides the displacement law of the first doublet in respect with the object abscissa of the microscope. The design of the microscope uses an original software, developed for the basic calculus. The specialized software OSLO LT was used for the analysis of image quality and proved a very high quality for the original components.

**Keywords:** analytical methods of measuring apparatuses

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# DIFFERENT FORCE FIELDS APPLICATIONS TO THEORETICAL GROWTH FORMS OF OXIDE CRYSTALS

## Mirela F. NICOLOV, Cornelis F. WOENSDREGT

**Abstract :** Quartz is known as a technologically important material. F faces grow according to a two-dimensional growth mechanism and are the only forms to be expected on the growth form. Computation of attachment energies, which are considered to be directly related charge model taking into account Born repulsion and van de Waals contributions. Theoretical growth forms based on several different force fields are presented.

**Keywords:** growth mechanism, Born repulsion, van der Waals contributions

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# ANALYSIS OF CRYSTAL STRUCTURE AND MORPHOLOGY

## Mirela F. NICOLOV, Cornelis F. WOENSDREGT

**Abstract :** Physical analysis of the theoretical $TiO_2$ structure was done.

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