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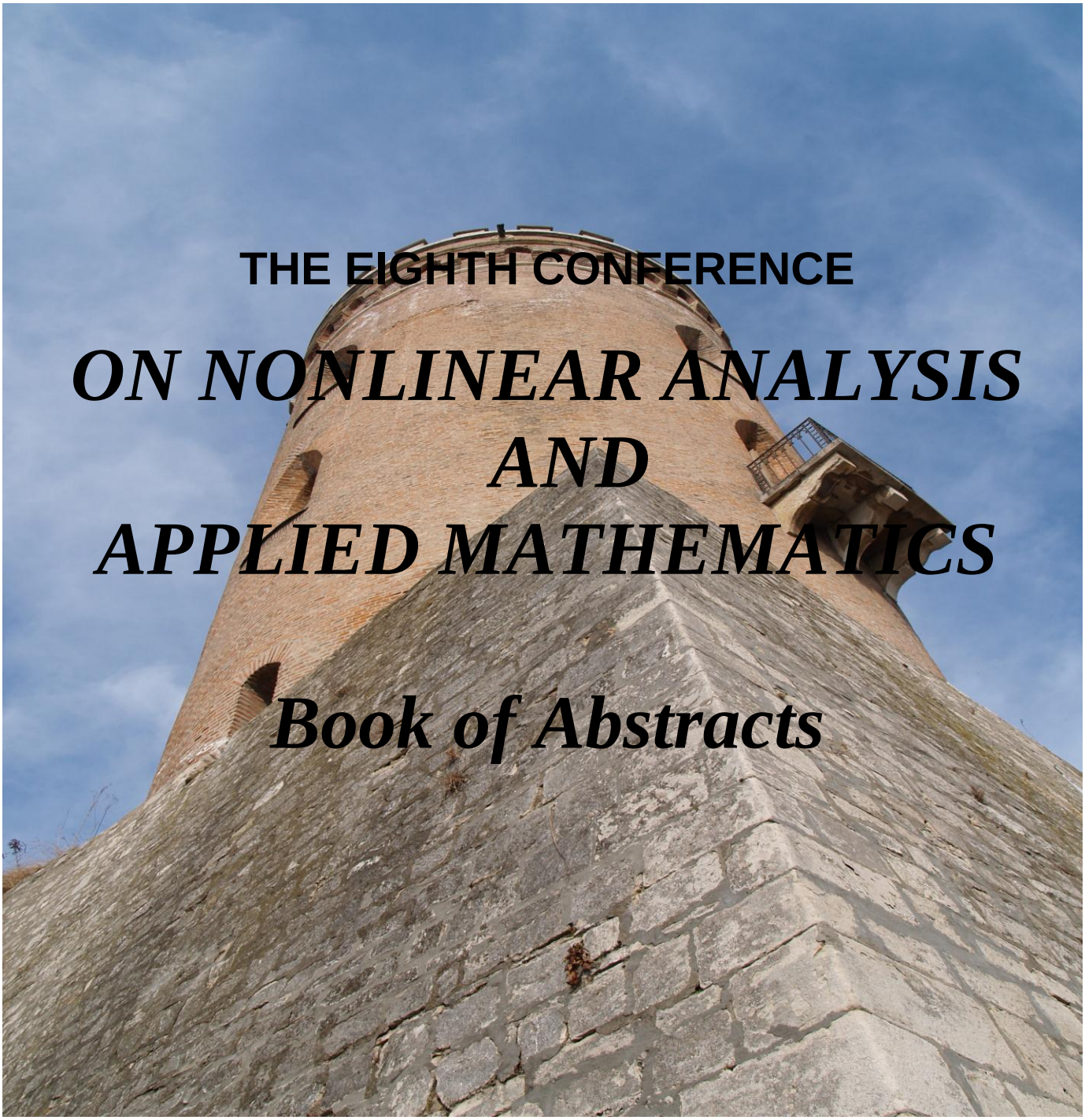

THE EIGHTH CONFERENCE

ON NONLINEAR ANALYSIS AND APPLIED MATHEMATICS

Book of Abstracts

Târgovişte, June, 11th –12th, 2010

THE EIGHTH CONFERENCE

ON NONLINEAR ANALYSIS AND APPLIED MATHEMATICS

Târgovişte, June, 11th –12th, 2010

Sections:

- **Differential Equations and Nonlinear Analysis**
- **Mathematical Analysis and Applied Mathematics**
- **Didactics of Mathematics**

Scientific Comittee:

Silviu Sburlan (Mircea cel Batran Naval Academy of Constanta), Grzegorz Karch (University of Wroclaw), Drumi Bainov (Sofia-University), Constantin P. Niculescu (University of Craiova), A. K.Chongdar (Bengal Engineering and Science University), Adrian Carabineanu (University of Bucharest), Miron Oprea (University of Ploiesti), Constantin Ghita (Valahia University of Targoviste), Cristinel Mortici (Valahia University of Targoviste), Andrei Vernescu (Valahia University of Targoviste), Dinu Teodorescu (Valahia University of Targoviste).

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- **Cristinel Mortici – Head of Department of Mathematics**

P L E N N A R Y C O N F E R E N C E S

CHAIRMAN: **NICOLAE POP**

LOCAL NUMERICAL SOLUTION OF ELASTIC EQUILIBRIUM PROBLEMS

Silviu SBURLAN

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Abstract: Sometimes it is necessary to evaluate the solution of an equilibrium problem in some points/strips from practical reasons. Therefore we must develop numerical methods for this purpose. In this respect we adapted the Somiliagna's method that it allows to solve the problem as a boundary element problem.

THE APPLICATION OF THE BOUNDARY ELEMENT METHOD TO DRAINAGE AND IRRIGATION PROBLEMS

ADRIAN CARABINEANU
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Abstract: We treat the drainage and irrigation problems as 2d free boundary problems for Laplace equation. An iterative procedure based on the complex boudary element method is utilized for constructing the free surface which separates the saturated zone from the unsaturated one in the ground.

TWO VARIANTS IN THE PROBLEM OF THE MATCH

ALEXANDRU POPESCU-ZORICA
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Abstract: We present a problem of geometric probabilities in two variants. Considering a segment, we divide this by a point and after this, we divide the bigger of these by another point. We examine the probability that the final three segments can be the sides of a triangle. A second variant is the one in which we consider directly three new segments determined by two points on the initial segment. This problem was a subject of certain discussions with the well known Romanian mathematician Gheorghe Mihoc (1906-1981).

TROPICAL STRUCTURES IN GRAPH THEORY

MIRON OPREA
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Abstract: At the basis of tropical mathematics creation by the brazilian mathematician Imre Simon and french researchers in informatics I. Itenberg, O. Viro, G. Mikhalkin etc, was set the following principle: "*To study mathematical objects with simple binary operations and to provide theorems on complicated mathematical objects*". Thus, in less than 15 years (1996-2009), it was set a geometry and an algebra with spectacular applications in combinatorics, graph theory, enumerative geometry, mathematical biology and even in the solve of the 16^{th} problem of Hilbert. These facts show that the reality is much more fuzzy (or that it has much more levels), that we cannot model only by using classical mathematics, no matter how elaborated is that.

In this paper it is made first a brief presentation of the tropical Mathematics with a focus on it fundamental structure of diod $(\mathcal{D}, \oplus, \otimes)$ which will play an essential role in optimization problems from graph theory. Some dioids are highlighted (with the slective law $\oplus$: $x\oplus y\in\{x, y\}$) as: R_{min}; Z_{min}; N_{min}; $(\mathcal{F}, \oplus^{\bullet}, °)$, where $\mathcal{F}=\{f: \mathcal{D}\to\mathcal{D} \mid f(x\oplus y) = f(x)\oplus f(y)\ ,\ f(0)=0\}$. Next, the author builds a total order tropical geometry by using the ordering relation $\forall x,y\in\mathcal{D}$, $x\le y \Leftrightarrow x\oplus y=x$, instantiated on the adjacent matrix set of a finit graph to allow the construction of the paths $(\gamma)\in\Gamma_{ij}$ with $\omega(\gamma)=\otimes_{p=0}^{k-1}\delta(i_p, i_{p+1})$ and their weights $\oplus_{\gamma\in\Gamma ij}\omega(\gamma)$.

In the end, the author gives and demonstrates two theorems:

1) Each term (i, j) from A^k, (where A is the matrix associated to the graph G) is the sum of the weights that link i with j in k arcs, i.e. $\forall\ k\in N$, $\forall(i, j)\in [[1, n]]^n$, $(A^k)_{i,j} = \oplus_{\gamma\in\Gamma ij}\omega(\gamma)$.

2) In a graph G with *n* vertices without absorbant circuits, for any $k\ge n$, we obtain $A^k=A^{n-1}$.

On the basis of these theorems it is solved the problem of the shortest path in a graph as a solution of the linear system $X=X\otimes A\oplus B$.

CONFERENCE PROGRAMME

Friday 11.06.2010

Time	Action
9.00-13.00	Participants Registration
13.00-13.30	Welcome and Opening Ceremony
13.30-14.00	Lunch
14.00-15.00	Plenary Sessions
15.00-15.30	Book Release
15.30-16.00	Coffee Break
16.00-18.00	Concurrent Sessions
18.00-18.20	Coffee Break
18.20-20.00	Concurrent Sessions
20.30	Official Dinner

Saturday 12.06.2010

Time	Action
9.30-10.00	Breakfast
10.00-11.00	Plenary Sessions
11.00-11.10	Conference Closing
11.10-12.00	Brunch
12	Participants Departure

List of Participants (Alphabetical Order):

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AN INEQUALITY WITH THE τ FUNCTION

MARIUS BURTEA, GEORGETA BURTEA
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Abstract: We present an inequality with the function $\tau : N^* \to N^*$, which represents the number of natural divisors of a number. We also give some improvements of some known inequlities involving this function.

PROPAGATORS AND DILATIONS ON PSEUDO-HILBERT SPACES

LOREDANA CIURDARIU, PĂSTOREL GAŞPAR
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Abstract: In this paper we shall try to transpose the conditions of the existence of propagators for kernel on *-semigroups, notion which was introduced by P. Masani [5]. We will start with a few additional observations concerning *- representations and then some properties of propagators and dilations will be presented.

THE ISOPERIMETRIC INEQUALITY AND ITS CONSEQUENCES

DAN COMA
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Abstract: We give an historical view of the isoperimetric problem, including the isoperimetric inequality and we prove in an accessible manner some of the principal facts related to this. As concluding remarks, we give some consequences regarding the usual geometrical figures in the plane.

OPTIMALITY IN NONDIFFERENTIAL MULTIOBJECTIVE PROGRAMMING

ALINA CONSTANTINESCU
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Abstract: This paper is concerning on the multiobjective programming problem where the function involved are nondifferentiable. We present and prove the sufficient conditions for a feasible point to be weakly efficient. Our research starts from the invexity proposed by H. Slimani and M.S. Rajdef and extend their concept for the case when the functions are nondifferentiable. To solve the problem in this new framework we show how local cone approximation concept can be used. Thus we provide a new approach for the nondifferentiable multiobjective programming problems that can be easily applied in the practical problems.

MATHEMATICS THROUGH PLAY, BETWEEN CREATION AND RECREATION

EMILIAN DEACONESCU
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Abstract: Mathematics is for many something abstract , without a beauty that would attract and delight but promotes creative thinking . Teaching classic statement is replaced with interactive activities , through which learning can contribute during the development of creativity .

AGE-STRUCTURED POPULATIONS, MODELLED AS DYNAMICAL SYSTEMS

NINA DRĂGOESCU (CAZACU)
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Abstract: This paper refers to the behaviour of the age-structured populations, modelled as dynamical systems, under the influence of the external disturbing factors. We study the behavior of different kind of populations of Fibonacci' rabbits type, structured on age classes.

CONVEX HULL PROBLEM, LATTICE POINTS AND APPLICATIONS

DUMITRU FANACHE
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Abstract: Problem of finding convex hull is one of the central problems of computational geometry. It appears both applications in economic, financial, environmental, architectural and analytical geometry in specific issues. Latticial point is called (in the plane or in space) at any point whose coordinates are integers. Historically, lattices were investigated since the late 18th century by mathematicians such as Lagrange, Gauss, and later Minkowski. More recently, lattices have become a topic of active research in computer science. They are used an algorithmic tool to solve a wide variety of problems; they have many applications in cryptography and cartography; and they have some unique properties from a computational complexity point of view.

GLOBAL AND LOCAL CONSIDERATIONS ABOUT THE EVOLUTION OF FORCES CONCENTRATED ON DISLOCATIONS

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Abstract: The experimental tests assure arguments about the idea that the distribution of defects is generated during plastic deformation, underlying the plastic flow, as a basic phenomenon, which explain the plastic flow. Some of these dislocations towards the internal crystal interfaces, forming slip lines, others may be stored at the grain limit to harden the materials, which are related to plastic strain gradients and induce plastic slip and generally yielding. Mutual interactions between discontinuities developed in presence of impurities and vacances, which act as obstacles in the evolution of movement, permit us to introduce the dislocation densities as new internal variables in the theory of gradient plasticity.

APPLICATION OF BÉZIER SURFACES TO 3D DEFORMABLE MODELS

OCTAVIAN GURZĂU
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Abstract: In this paper we use Bézier Surfaces to obtain an approximation of a 3D deformable model obtained from medical images. ntroduce some mathematical notions using the soft "Mathematica" from Wolfram Research. This fact leads to a better understanding of them for students.

INTERESTING ALGEBRA-GEOMETRY CONNECTIONS

ILARIE LAZAR
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Abstract:We prove some algebraic identities using geometry and we establish some geometrical formulas by algebraic arguments.

THE VORONOVSKAJA TYPE THEOREM FOR SZASZ-MIRAKJAN-KANTOROVICH OPERATORS

DAN MICLAUS
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Abstract: The present article continues earlier research by O. T. Pop and the author establishes a convergence theorem and the evaluation of the rate of convergence in terms of first order modulus of continuity, for the well known Szasz-Mirakjan-Kantorovich operators.

ABOUT A TEHNIQUE OF SOLVING SOME DIFFERENTIAL STOCHASTIC ITÔ EQUATIONS

DOINA MIHAI
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Abstract: The differential stochastic systems modeled the evolutive phenomena of environment perturbated by stochastic forces. In this article it solved, using the Itô's formula, some differential stochastic systems for a vibrating string subject to a stochastic force and electric
circuit.

IMPROVEMENTS OF SOME GAMMA FUNCTION APPROXIMATIONS

CRISTINEL MORTICI
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Abstract: We give an elementary method for establishing and proving new accurate bounds for gamma function.

A LAGRANGE MULTIPLIER APPROACH FOR DARCY-STOKES FLOW

ALIN POHOAŢĂ, EMIL LUNGU
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Abstract: The aim of this paper is to give a finite element solution using Lagrange multipliers method for a family of systems of singular perturbation problems of a saddle point structure.

ON THE NUMERICAL ALGORITHMS FOR CONTACT PROBLEMS WITH FRICTION

NICOLAE POP
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Abstract. In this paper, we consider numerical approximations of the quasi-static contact problem with dry friction, using finite elements for the displacements and finite difference for the temporal derivative of the displacements. The quasistatic problem will be resolved step by step, such that at each step we shall calculated small strains and small displacements and we will add to the previously calculated result, for small changes of the applied forces. Obviously, both the contact area and the contact state are changing (open contact, fixed contact and sliding contact). We consider numerical approximations of 3D quasi-static contact problem with dry friction, using finite contact elements. Lagrange incremental multipliers method and penalty functions are used to enforce finite element surface contact constrains for incremental formulation of the quasi-static problem. Some typical examples in the elastic contact problems with dry friction are presented.

EXPONENTIAL SERIES AND COMBINATORIAL PROBLEMS

VASILE POP
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Abstract: In this paper we analyze two problems of combinatorial geometry,colouring problems, that, by the solving method have a tight connection with the series $e=\sum_{n=0}^{\infty}\frac{1}{n!}$ Particular cases of these problems have been proposed at the International Mathematical Olympiads, editions V and XX.

THE STABILITY OF THE FUNCTIONS THAT TRANSFORMS MEANS IN OTHER MEANS

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Abstract: We prove the Hyers-Ulam stability of some functional equations involving function that transform some classical means in another classical means.

ON THE INVERSE PROBLEM FOR AN AVERAGED OPERATOR IN HILBERT SPACES

DINU TEODORESCU
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Abstract: The aim of this paper is to present some properties of the averaged operators defined in Hilbert spaces. We are interested in the study of the existence of an inverse for the averaged operator associated to a strongly monotone operator.

ON THE IMAGES OF SOME OPEN SETS HAVING THE NON-EMPTY INTERSECTION PROPERTY

DINU TEODORESCU
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Abstract: Let E and F be normed spaces, $T : E \to F$ and $V : E \to F$ satisfying $T(O_1) \cap (O_2) \neq \emptyset$ for all $O_1;O_2$ non-empty open subsets of E. In this paper we present some aspects about the properties of the functions T and V .

MATHEMATICS IN THE EGIPTIAN PAPYRUSES

MARINA TOMA
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Abstract: We review some of most important problems met in the two egyptian papyruses, which are very illustrative for the way the ancient egyptians did their mathematical calculations.

LOCALLY AFFINE FUNCTIONS

CORNELIU UDREA
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Abstract: In this paper an attempt is made define a generalization of this type of functions (i.e. it is defined the quasi locally convex functions), some properties of the quasi-locally convex functions are studied, and an important example of quasi-locally affine function is presented.

FINITENESS PROPERTIES FOR THE PATH COALGEBRA ASSOCIATED TO A POSET

GEORGIANA VELICU
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Abstract: Let *P* be a partially ordered set (poset) locally finite and *kQ* the path coalgebra over a field *k* associated to *P*. In this paper we investigate finiteness properties of this coalgebra by using an injective morphism of coalgebras from incidence coalgebra *kS* of *P* to the path coalgebra *kQ*. We deduce that *kQ* is left semiperfect only if *kS* have the same property, and that *kQ* is cosemisimple when the order relation on *P* is the equality. Finally we characterize the coradical filtration of the path coalgebra.

ON THE SPEED OF CONVERGENCE OF THE SEQUENCES

ANDREI VERNESCU
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Abstract: When we study every nontrivial convergence of a sequence of real numbers, we are interested not only to obtain the limit, but also to establish the speed of this convergence. The speed can be characterized by the first iterated limit (involving a function of natural variable which tends to zero). Also, a very significant characterization, of major importance, is given by the two-sided estimations of the absolute value of the difference between the general term of the sequence and the limit, which also gives, as a consequence, the first iterated limit.

Concurrent Sessions
Friday – June, 11th, 2010

Nonlinear Analysis and Applied Mathematics
(Chairman: VASILE POP)

16.00-16.20	LOCALLY AFFINE FUNCTIONS **CORNELIU UDREA**
16.20-16.40	OPTIMALITY IN NONDIFFERENTIAL MULTIOBJECTIVE PROGRAMMING **ALINA CONSTANTINESCU**
16.40-17.00	PROPAGATORS AND DILATIONS ON PSEUDO-HILBERT SPACES **LOREDANA CIURDARIU, PĂSTOREL GAŞPAR**
17.00-17.20	GLOBAL AND LOCAL CONSIDERATIONS ABOUT THE EVOLUTION OF FORCES CONCENTRATED ON DISLOCATIONS **CONSTANTIN GHIȚĂ**
17.20-17.40	ON THE INVERSE PROBLEM FOR AN AVERAGED OPERATOR IN HILBERT SPACES **DINU TEODORESCU**
17.40-18.00	ON THE SPEED OF CONVERGENCE OF THE SEQUENCES **ANDREI VERNESCU**
18.00-18.20	**COFEE BREAK**
18.20-18.40	ON THE NUMERICAL ALGORITHMS FOR CONTACT PROBLEMS WITH FRICTION **NICOLAE POP**
18.40-19.00	A LAGRANGE MULTIPLIER APPROACH FOR DARCY-STOKES FLOW **ALIN POHOAȚĂ, EMIL LUNGU**
19.00-19.20	IMPROVEMENTS OF SOME GAMMA FUNCTION APPROXIMATIONS **CRISTINEL MORTICI**
19.20-19.40	THE STABILITY OF THE FUNCTIONS THAT TRANSFORMS MEANS IN OTHER MEANS **VASILE POP**
19.40-20.00	AGE-STRUCTURED POPULATIONS, MODELLED AS DYNAMICAL SYSTEMS **NINA DRĂGOESCU(CAZACU)**

Mathematical Analysis and Didactics
(Chairman: DINU TEODORESCU)

16.00-16.20	APPLICATION OF BÉZIER SURFACES TO 3D DEFORMABLE MODELS **OCTAVIAN GURZĂU**
16.20-16.40	INTERESTING ALGEBRA-GEOMETRY CONNECTIONS **ILARIE LAZAR**
16.40-17.00	THE ISOPERIMETRIC INEQUALITY AND ITS CONSEQUENCES **DAN COMA**
17.00-17.20	CONVEX HULL PROBLEM, LATTICE POINTS AND APPLICATIONS **DUMITRU FANACHE**
17.20-17.40	EXPONENTIAL SERIES AND COMBINATORIAL PROBLEMS **VASILE POP**
17.40-18.00	MATHEMATICS IN THE EGIPTIAN PAPYRUSES **MARINA TOMA**
18.00-18.20	**COFEE BREAK**
18.20-18.40	MATHEMATICS THROUGH PLAY , BETWEEN CREATION AND RECREATION **EMILIAN DEACONESCU**
18.40-19.00	ABOUT A TEHNIQUE OF SOLVING SOME DIFFERENTIAL STOCHASTIC ITÔ EQUATIONS **DOINA MIHAI**
19.00-19.20	FINITENESS PROPERTIES FOR THE PATH COALGEBRA ASSOCIATED TO A POSET **GEORGIANA VELICU**
19.20-19.40	ON THE IMAGES OF SOME OPEN SETS HAVING THE NON-EMPTY INTERSECTION PROPERTY **DINU TEODORESCU**
19.40-20.00	AN INEQUALITY WITH THE τ FUNCTION **MARIUS BURTEA, GEORGETA BURTEA**