INTERNATIONAL CONFERENCE ON APPLIED AND PURE MATHEMATICS

IAŞI, ROMANIA
Octorber 31 – November 3, 2019

SCIENTIFIC PROGRAMME & ABSTRACTS

http://math.etc.tuiasi.ro/apm2019/

International Conference on Applied and Pure Mathematics (ICAPM 2019)
PROGRAMME

THURSDAY October 31		
08:00 - 10:00	Registration	
10:00 - 11:00	Opening Ceremony	
11:00 - 11:30	Coffee-Break	
Chairman:	*C. Lefter (room P2)*	
11:30-12:15	V. Barbu	
12:15 - 13:00	D. Beltiță	
13:00 - 14:00	Lunch	
Chairman:	*B. Satco (P5)*	*M. Roman (P2)*
14:00 - 14:25	A. Ciomaga	R. Peter
14:25 - 14:50	P. Georgescu	I. Bucătaru
14:50 - 15:15	I. Munteanu	I. Pleşca
15:15 - 16:00	Coffee-Break	
Chairman:	*P. Georgescu (P5)*	*M. Munteanu (P2)*
16:00 - 16:25	O. Gurzău	S. Druță
16:25 - 16:50	G. Dimitriu	M.S. Lazorec
16:50 - 17:15	E.A. Melnig	

FRIDAY November 1		
Chairman:	*A. Sandovici (room P2)*	
09:00 - 09:45	F. Vasilescu	
09:45 - 10:30	P. Jebelean	
10:30 - 11:00	Coffee-Break	
Chairman:	*D. Fetcu (room P2)*	
11:00 - 11:45	H. Urakawa	
11:45 - 12:30	L. Beznea	
12:30 - 14:00	Lunch	
Chairman:	*A. Ciomaga (P4)*	*R. Peter (P2)*
14:00 - 14:25	G. Lițcanu	M. Munteanu
14:25 - 14:50	B. Satco	A. Sandovici
14:50 - 15:15	T. Paşa	D. Fetcu
15:15 - 16:00	Coffee-Break	
Chairman:	*R. Strugariu (P4)*	*S. Romaniuc (P2)*
16:00 - 16:25	T. Chelmuş	G. Crețu
16:25 - 16:50	D. Maxim	A. Sonea
16:50 - 17:15	A. Lazu	A.I. Nistor

SATURDAY November 2		
Chairman:	*C. Lefter (room P2)*	
10:00 - 10:45	G. Marinoschi	
10:45 - 11:30	T.Q. Binh	
11:30 - 13:00	Lunch	
13:00 - 14:00	Visit of Palace of Culture	
14:00 - 17:00	Excursion at Hermeziu Winery (wine tasting)	
17:00 - 21:00	Festive Dinner	

SUNDAY November 3	
Chairman:	*R. Lițcanu (room P2)*
09:00 - 09:45	M. Aprodu
09:45 - 10:30	E. Vîlcu
10:30 - 11:00	Coffee-Break
Chairman:	*D. Roşu (P4)*
11:00 - 11:25	L. Maticiuc
11:25 - 11:50	E. Rotenstein
11:50 - 12:15	O. Tărniceriu
12:15 - 12:40	G. Grosu

SCIENTIFIC PROGRAMME

Thursday, October 31

08:00 – 10:00 **Registration**

Opening Ceremony
"Carmen Sylva" Aula[1]

10:00 - 11:00 **Opening Ceremony**

11:00 – 11:30 **Coffee-Break**

Plenary Session
Amphitheater P2[1]

Chairman: **Cătălin LEFTER** (Iaşi, Romania)

11:30 - 12:15 **Viorel BARBU** (Iaşi, Romania)
Ordinary differential equations - transport equations and stochastic differential equations - Fokker-Planck equations

12:15 – 13:00 **Daniel BELTIȚĂ** (Bucureşti, Romania)
Standard groupoids of von Neumann algebras

13:00 - 14:00 **Lunch**

Afternoon Session I
Amphitheater P5[1]

Chairman: **Bianca SATCO** (Suceava, Romania)

14:00 - 14:25 **Adina CIOMAGA** (Paris, France)
Segmentation of STM images using variational methods and empirical wavelets

14:25 - 14:50 **Paul GEORGESCU** (Iaşi, Romania)
On constant mean curvature biharmonic surfaces

14:50 - 15:15 **Ionuț MUNTEANU** (Iaşi, Romania)
Proportional boundary stabilizers for parabolic equations

15:15 - 16:00 **Coffee-Break**

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[1] Faculty of Electronics, Telecommunications and Information Technology, Technical University, Carol I Blvd., no. 11

Chairman: **Paul GEORGESCU** (Iaşi, Romania)

16:00 - 16:25 **Octavian Mircia GURZĂU, Vicuța NEAGOŞ, Florin POPIŞTER** (Cluj-Napoca, Romania)
An approximation of a surface using Bernstein's polynomials

16:25 - 16:50 **Gabriel DIMITRIU** (Iaşi, Romania)
Global sensitivity results for a dengue virus model

16:50 - 17:15 **Elena-Alexandra MELNIG** (Iaşi, Romania)
Carleman inequalities in L^q. Stability source estimates in inverse parabolic problems

Afternoon Session II

Amphitheater P2[1]

Chairman: **Marcel ROMAN** (Iaşi, Romania)

14:00 - 14:25 **Radu PETER** (Cluj-Napoca, Romania)
Sufficient criteria for obtaining Hardy inequalities on Finsler manifolds

14:25 - 14:50 **Ioan BUCĂTARU** (Iaşi, Romania)
Algebraic characterisation for Finsler spaces of constant flag curvature

14:50 - 15:15 **Iulia PLEŞCA** (Iaşi, Romania)
Algebraic Heun operators

15:15 - 16:00 **Coffee-Break**

Chairman: **Marian MUNTEANU** (Iaşi, Romania)

16:00 - 16:25 **Simona DRUȚĂ-ROMANIUC** (Iaşi, Romania)
A unified approach to general natural structures on cotangent bundles

16:25 - 16:50 **Mihai Silviu LAZOREC** (Iaşi, Romania)
A connection between the number of subgroups and the order of a finite group

Friday, November 1

Plenary Session

Amphitheater P2

Chairman: **Adrian SANDOVICI** (Iaşi, Romania)

9:00 - 9:45 **Florian-Horia VASILESCU** (Lille, France)
Spectrum and functional calculus in real and quaternionic frameworks

9:45 - 10:30 **Petru JEBELEAN** (Timişoara, Romania)
Geometrically distinct periodic solutions for the relativistic operator

10:30 – 11:00 **Coffee-Break**

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[1] Faculty of Electronics, Telecommunications and Information Technology, Technical University, Carol I Blvd., no. 11

Chairman: **Dorel FETCU** (Iaşi, Romania)

11:00 – 11:45 **Hajime URAKAWA** (Sendai, Japan)
Harmonic maps and biharmonic Riemannian submersions

11:45 – 12:30 **Lucian BEZNEA** (Bucureşti, Romania)
From Gaussian estimates for nonlinear evolution equations to long time behavior of branching processes

12:30 - 14:00 **Lunch**

Afternoon Session I
Amphitheater P4

Chairman: **Adina CIOMAGA** (Paris, France)

14:00 - 14:25 **Gabriela LIŢCANU** (Iaşi, Romania)
Pattern formation in reaction diffusion-systems

14:25 - 14:50 **Bianca SATCO** (Suceava, Romania)
Approximating the solutions of measure differential inclusions

14:50 - 15:15 **Tatiana PAŞA** (Chişinău, Moldova)
Solving the non-linear multi-index transportation problem with concave cost functions

15:15 - 16:00 **Coffee-Break**

Chairman: **Radu STRUGARIU** (Iaşi, Romania)

16:00 - 16:25 **Teodor CHELMUŞ** (Iaşi, Romania)
Directional Pareto efficiency

16:25 - 16:50 **Diana Elena MAXIM** (Iaşi, Romania)
Optimality conditions for directional Pareto efficiency

16:50 - 17:15 **Ovidiu CÂRJĂ, Alina LAZU** (Iaşi, Romania)
Minimum time and minimum energy for linear systems

Afternoon Session II
Amphitheater P2

Chairman: **Radu PETER** (Cluj-Napoca, Romania)

14:00 - 14:25 **Marian MUNTEANU** (Iaşi, Romania)
Contact CR submanifolds in S^7

14:25 - 14:50 **Adrian SANDOVICI** (Iaşi, Romania)
On a class of linear relations in Hilbert spaces

14:50 - 15:15 **Dorel FETCU** (Iaşi, Romania)
Bochner-Simons formulas and the rigidity of biharmonic submanifolds

15:15 - 16:00 **Coffee-Break**

Chairman: **Simona DRUȚĂ-ROMANIUC** (Iaşi, Romania)

16:00 - 16:25 **Georgeta CREȚU** (Iaşi, Romania)
New Finslerian version of Schur's Lemma and its applications

16:25 - 16:50 **Andromeda SONEA** (Iaşi, Romania)
The class equation in complete hypergroup theory

16:50 - 17:15 **Ana-Irina NISTOR** (Iaşi, Romania)
Trajectories in 3-dimensional manifolds

Saturday, November 2

Plenary Session
Amphitheater P2

Chairman: **Cătălin LEFTER** (Iaşi, Romania)

10:00 - 10:45 **Gabriela MARINOSCHI** (Bucureşti, Romania)
Mathematical modelling, analysis and therapy control in prostate tumor growth

10:45 - 11:30 **Tran Quoc BINH** (Debrecen, Hungary)
Some remarks on the intersection of Riemannian submanifolds

11:30 - 13:00 **Lunch**

13:00 - 14:00 **Visit to the Palace of Culture**

14:00 - 17:00 **Excursion at Hermeziu Winery**

17:00 - 21:00 **Festive Dinner**

Sunday, November 3

Plenary Session
Amphitheater P2

Chairman: **Răzvan LIȚCANU** (Iaşi, Romania)

09:00 - 09:45 **Marian APRODU** (Bucureşti, Romania)
Koszul modules and applications

09:45 - 10:30 **Gabriel-Eduard VÎLCU** (Ploieşti, Romania)
Geometric properties of production models

10:30 – 11:00 **Coffee-Break**

Regular Session
Amphitheater P4

Chairman: **Daniela ROŞU** (Iaşi, Romania)

11:00 - 11:25 **Lucian MATICIUC, Aurel RĂŞCANU** (Iaşi, Romania)
Existence and continuity of the viscosity solutions via generalized Feynman-Kac representation formula

11:25 - 11:50 **Eduard ROTENSTEIN** (Iaşi, Romania)
Backward stochastic dynamics driven by an unbounded subdifferential operator on a filtered probability space

11:50 - 12:15 **Carmen Oana TĂRNICERIU** (Iaşi, Romania)
A nonlinear PDE system describing a network of neurons with Poisson-spiking mechanism

12:15 - 12:40 **Gabriela GROSU** (Iaşi, Romania)
Compactness results for the solution operator of a linear Cauchy problem with measures

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BOOK OF ABSTRACTS

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INVITED SPEAKERS

Koszul modules and applications

Marian APRODU
University of Bucharest and "Simion Stoilow" Institute of Mathematics of the Romanian Academy, Bucharest, Romania
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Koszul modules are rather simple objects defined by a subspace in a second exterior power. In this talk, based on a joint work with G. Farkas, S. Papadima, C. Raicu and J. Weyman, I shall present a vanishing result for Koszul modules and applications in algebraic geometry and geometric group theory.

Ordinary differential equations – transport equations and stochastic differential equations – Fokker-Planck equations

Viorel BARBU
"Octav Mayer" Institute of Mathematics of the Romanian Academy, Iaşi, Romania
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One surveys some classical and more recent results on existence of generalized solutions to transport and Fokker-Planck equations.

Standard groupoids of von Neumann algebras

Daniel BELTIŢĂ
"Simion Stoilow" Institute of Mathematics of the Romanian Academy, Bucharest, Romania
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The standard groupoid, which we introduce, encodes a few key elements of the standard form and of the modular theory of an arbitrary von Neumann algebra. That groupoid carries two compatible structures, namely an infinite-dimensional Lie groupoid structure and a Poisson bracket. Specific properties of the von Neumann algebra under consideration are reflected by geometric properties of its corresponding standard groupoid. This presentation is based on joint work with Anatol Odzijewicz.

From Gaussian estimates for nonlinear evolution equations to long time behavior of branching processes

Lucian BEZNEA
University of Bucharest and "Simion Stoilow" Institute of Mathematics of the Romanian Academy, Bucharest, Romania
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We study solutions to a nonlinear evolution equation in $\mathbb{R}^d$, associated to a branching process. First, we deal with existence, uniqueness, and the asymptotic behavior of the solutions when the time tends to infinity. It turns out that the distribution of the associated branching process behaves, when the time tends to infinity, like that of the Brownian motion on the set of all finite configurations of $\mathbb{R}^d$. However, due to the lack of conservation of the total mass of the initial non linear equation, a deformation with a multiplicative coefficient occurs. Finally, we establish asymptotic properties of the occupation time of this branching process. The talk is based on a joint work with Liviu I. Ignat and Julio D. Rossi.

Some remarks on the intersection of Riemannian submanifolds

Tran Quoc BINH
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Let M^n be an n-dimensional complete connected Riemannian manifold with positive sectional curvature, and let V^r and W^s be two compact, totally geodesic submanifolds of dimensions r and s. In 1961 T. Frankel proved that V^r and W^s are always intersecting provided $r + s = n$. Later a number of analogous results were achieved: for Kähler manifolds by S. I. Goldberg and S. Kobayashi, for nearly Kähler ones by A. Gray, for quaternionic Kähler manifolds by S. Marchiafava, for locally conformal Kähler manifolds by L. Ornea and for compact regular Sasakian manifolds by S. Tanno and Y. -B. Baik. Recently K. Kenmotsu and C. Xia, have obtained similar results on manifolds with partially positive curvature. In this talk, we prove the results of a similar type in a Riemannian space for two minimal hypersurfaces. We present a construction of Sasakian manifolds with k-positive bisectional curvature. In analogy to the Kähler case, an orthonormal vector system is obtained in a Sasakian manifold, which is parallel along a geodesic. Using this vector system, we prove an intersection theorem of Frankel type for two compact invariant submanifolds of a Sasakian space with k-positive bisectional curvature.

As the application, we give the Galloway's compactness theorem on Sasakian manifolds.

Geometrically distinct periodic solutions for the relativistic operator

Petru JEBELEAN
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We discuss the existence of multiple geometrically distinct periodic solutions to nonlinear perturbations of the relativistic operator:

$$u \mapsto \left(\frac{u'}{\sqrt{1 - |u'|^2}} \right)' .$$

The main hypothesis on the perturbations here involved is that they have periodicity properties with respect to only a part of the unknown variables. Our approach relies

on a variational argument concerning the multiplicity of critical orbits. The talk will provide an overview of recent and ongoing work in this direction. Based on joint work with Jean Mawhin and Călin Şerban.

Mathematical modelling, analysis and therapy control in prostate tumor growth

Gabriela MARINOSCHI

"Gheorghe Mihoc - Caius Iacob" Institute of Mathematical Statistics and Applied Mathematics of the Romanian Academy, Bucharest, Romania

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We present a mathematical model of prostate tumor growth with two types of therapies that may enable physicians to test and design personalized chemotherapeutic protocols in silico. We use the phase-field model to describe the tumor growth, which we assume to be driven by a generic nutrient following a reaction-diffusion dynamics. We prove the well-posedness of our model, run a series of representative simulations for the cases without or with therapies and compare their effects for mild and agressive tumors.

Then, an optimal combination of therapies intented to minimize the tumor volume after some time is studied by means of a minimization problem. Conditions of optimality are derived.

Harmonic maps and biharmonic Riemannian submersions

Hajime URAKAWA

Tohoku University, Sendai, Japan

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Overviews on my works of harmonic maps, especially biharmonic maps on Riemannian submersions are given. Results on harmonic maps and biharmonic maps on principal bundles and warped products are shown. Furthermore, related topics on pseudo harmonic maps, pseudo biharmonic maps on CR manifolds, and transversally harmonic maps and biharmonic maps on foliated Riemannian manifolds are explained. Lastly, recent results on biharmonic Riemannian submersions will be shown.

Spectrum and Functional Calculus in Real and Quaternionic Frameworks

Florian-Horia VASILESCU
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We investigate the spectrum and the analytic functional calculus for quaternionic linear operators, having as a model some elements from the spectral theory of real linear operators. We show that the construction of the analytic functional calculus for real linear operators can be refined to get a similar construction for quaternionic linear ones, in a classical manner, using a Riesz-Dunford-Gelfand type kernel. A quaternionic joint spectrum for pairs of operators is also discussed, and an analytic functional calculus is constructed, via a Martinelly type kernel in two variables.

Geometric properties of production models

Gabriel-Eduard VÎLCU
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A subject of great interest in economic analysis is to study the production models via geometric properties of their associated graph hypersurfaces [2, 3]. We will present some recent results on the geometry of production functions, focusing on the (quasi-) product production models [1]. The graph hypersurfaces associated with the product functions are of interest not only in economic analysis, but also in classical differential geometry, where they were previously investigated under the name of factorable or homothetical hypersurfaces. The results will be discussed both in terms of differential geometry and economics.

[1] H. Alodan, B.-Y. Chen, S. Deshmukh, G.-E. Vilcu, *On some geometric properties of quasi-product production models*, J. Math. Anal. Appl. 474(1) (2019), 693-711.

[2] B.-Y. Chen, G.-E. Vilcu, *Geometric classifications of homogeneous production functions*, Appl. Math. Comput. 225 (2013), 345-351.

[3] G.-E. Vîlcu, *A geometric perspective on the generalized Cobb- Douglas production functions*, Appl. Math. Lett. 24(5) (2011), 777-783.

CONTRIBUTED TALKS

Algebraic Characterisation for Finsler Spaces of Constant Flag Curvature

Ioan BUCĂTARU
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We provide an algebraic characterisation for Finsler spaces of constant flag curvature. This characterisation is inspired by the integrability obstruction for the Finsler/projective metrizability problems. The characterisation is useful to address some problems concerning Finsler spaces of constant curvature, such as Beltrami Theorem and Hilbert's fourth problem.

Directional Pareto efficiency

Teodor CHELMUŞ
"Alexandru Ioan Cuza" University, Iaşi, Romania
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We study a notion of directional Pareto minimality that generalizes the classical concept of Pareto efficiency. Then, considering several situations concerning the objective mapping and the constraints, we give necessary and sufficient conditions for the directional efficiency. We investigate different cases and we propose some adaptations of well-known constructions of generalized differentiation. In this way, the connections with some recent directional regularities come into play. As a consequence, several techniques from the study of genuine Pareto minima are considered in our setting.

Segmentation of STM Images Using Variational Methods and Empirical Wavelets

Adina CIOMAGA

Universite Paris Diderot, Laboratoire Jacques Louis Lions, France and "Octav Mayer" Institute of Mathematics of the Romanian Academy, Iaşi, Romania

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In the fields of nanoscience and nanotechnology, it is important to be able to functionalize surfaces chemically for a wide variety of applications. Scanning tunneling microscopes (STMs) are important instruments in this area used to measure the surface structure and chemistry with better than molecular resolution. In order to assist in and to enhance the analysis of STM images, we propose an image-processing framework that produces two image segmentations: one is based on intensities (apparent heights in STM images) and the other is based on textural patterns. It combines a modified multiphase version of the local Chan-Vese model, while the texture image is segmented by a combination of 2D empirical wavelet transform and a clustering algorithm.

New Finslerian version of Schur's Lemma and its applications

Georgeta CREŢU

"Alexandru Ioan Cuza" University, Iaşi, Romania

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We provide three necessary and sufficient conditions (CFC-conditions) for a Finsler space to be of constant flag curvature. Depending on the dimension of the manifold, one of these three CFC-conditions is automatically satisfied. First and third CFC-conditions are projectively invariant and they have Riemannian correspondents. Third CFC-condition is given by a projectively invariant 2-form that plays the role of Cotton (Liouville) tensor. The second CFC-condition is purely Finslerian and it is projectively invariant if and only if the projective factor is a Hamel function. This condition restricts the validity of the Beltrami Theorem in the Finslerian context.

Global sensitivity results for a dengue virus model

Gabriel DIMITRIU
Department of Medical Informatics and Biostatistics, "Grigore T. Popa" University of Medicine and Pharmacy, Iaşi, Romania
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We consider a compartmental *within-host* model for dengue virus, incorporating the dichotomy between mature vs. immature virions. The analyzed *within-host* model involves target cells, infected cells, free virus and different types of immune cells, and anti-viral compounds. The aim of this talk is to present several global sensitivity results to explore the parameter and state sensitivities in the model. Sensitivity heat maps of the model variables, parameter sensitivity spectra and normalised singular spectra are performed.

A unified approach to general natural structures on cotangent bundles

Simona-Luiza DRUŢĂ-ROMANIUC
"Gheorghe Asachi" Technical University, Iaşi, Romania
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Our purpose here is to give a characterization à la Etayo and Santamaria for the general natural $(\alpha, \varepsilon)-$ structures on the total space T^*M of the cotangent bundle of a Riemannian manifold (M, g). We first obtain the general natural $\alpha-$structures on T^*M, and we prove that they depend on four coefficients of the energy density t in a cotangent vector p. Moreover, we show that the $\alpha-$structures obtained on T^*M are integrable if and only if (M, g) has constant sectional curvature c, and three of the coefficients depend on the other coefficients, their derivatives, c, t and α). Then, we consider a general natural lifted metric G on T^*M, and by studying its $\varepsilon-$compatibility with the obtained $\alpha-$structures we characterize the two classes of general natural (α, ε)-structures on T^*M (according to the value 1 or -1 of the product $\alpha\varepsilon$). We show that for the class with $\alpha\varepsilon = -1$ there are two proportionality relations between the coefficients of the $\alpha-$structure and those of the metric, and we prove that in this case the fundamental tensor field Ω is a closed $2-$form (i.e. the structure is of (almost) Kähler type) if and only if one of the proportionality factors is the derivative of the other one.

Bochner-Simons formulas and the rigidity of biharmonic submanifolds

Dorel FETCU
"Gheorghe Asachi" Technical University, Iaşi, Romania
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We present two new integral formulas of Simons and Bochner type and also some rigidity results and partial answers to conjectures on biharmonic submanifolds in spheres, obtained by using these formulas. This is a joint work with E. Loubeau and C. Oniciuc.

Active and passive mobilities in a metapopulation model: epidemiological implications

Paul GEORGESCU
"Gheorghe Asachi" Technical University, Iaşi, Romania
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In order to investigate the spread of a disease between a larger urban city and a comparatively smaller satellite city, we formulate a metapopulation model which incorporates multiple transmission modes and two distinct types of movements, active and passive. After finding the basic reproduction number of the model by means of the next generation method as being the spectral radius of a higher-dimensional matrix, we provide explicit estimations in terms of community-specific reproduction numbers which are less computationally intensive. We then perform a correlation analysis along with numerical simulations which lead to the conclusion that the disease is primarily transmitted via the vector-borne mode rather via the sexual transmission mode and that sexual transmission by itself can neither initiate nor sustain an outbreak.

Compactness results for the solution operator of a linear Cauchy problem with measures

Gabriela GROSU
"Gheorghe Asachi" Technical University, Iaşi, Romania
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We establish and prove some sufficient conditions for the compactness of the solution operator associated to a linear Cauchy problem involving measures.

An Approximation of a Surface using Bernstein's Polynomials

Octavian Mircia GURZĂU[1], Vicuţa NEAGOŞ[2], Florin POPIŞTER[3]
[1,2]Department of Mathematics, [3]Department of Design Engineering and Robotics,
Technical University of Cluj-Napoca, Romania
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In this paper we use Bernstein polynomials to fit a surface that is obtained from a matrix of coordinates of points. We consider the errors of the coordinates of the points and give an estimation of the error when approximate coordinates using Bernstein polynomials. We will give an example for a matrix with 483×99 points.

A connection between the number of subgroups and the order of a finite group

Mihai Silviu LAZOREC
"Alexandru Ioan Cuza" University, Iaşi, Romania
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Let G be a finite group. We study the ratio between the number of subgroups and the order of G. We determine the second minimum value of this ratio on the class of finite p-groups. Also, we show that the set formed of such ratios corresponding to all finite (abelian) groups is dense in the set of non-negative real numbers. Finally, we classify all finite abelian p-groups satisfying a certain property related to the above ratio.

Minimum time and minimum energy for linear systems

Ovidiu CÂRJĂ[1], **Alina LAZU**[2]
[1]"Octav Mayer" Mathematics Institute of the Romanian Academy,
[2]"Gheorghe Asachi" Technical University, Iaşi, Romania
vieru_alina@yahoo.com

We give estimates concerning regularity properties of the minimum time function and the minimum norm controls for linear control systems in an abstract setting. The estimates involve the controllability function given by the observability inequalities.

Pattern formation in reaction diffusion-systems

Gabriela LIŢCANU
"Octav Mayer" Mathematics Institute of the Romanian Academy, Iaşi, Romania
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In this talk we discuss how the interaction between diffusion and kinetics leads to pattern formation. We pursue Turing's idea which states that, under certain conditions, in a reaction-diffusion system it is possible to obtain steady state heterogeneous spatial patterns of chemical concentration.

Existence and continuity of the viscosity solutions via generalized Feynman-Kac representation formula

Lucian MATICIUC[1], **Aurel RĂŞCANU**[2]
[1]"Alexandru Ioan Cuza" University,
[2]"Octav Mayer" Mathematics Institute of the Romanian Academy, Iaşi, Romania
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We will present the proof of the continuity of the function $(t,x) \mapsto u(t,x)$, where $u(t,x) := Y_t^{t,x}$, with $(Y_s^{t,x})_{s\in[t,T]}$ being the solution of a suitable backward stochastic differential equation. We will prove that the sequence $(Y^{t_n,x_n})_{n\in\mathbb{N}}$ is tight with respect to the S-topology on the space $\mathbb{D}([0,T],\mathbb{R})$ of càdlàg functions (the acronym from the French: *continue à droite, limite à gauche*) and then we will use Helly-Bray type theorems.

Optimality conditions for directional Pareto efficiency

Diana Elena MAXIM
"Alexandru Ioan Cuza" University, Iaşi, Romania
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We introduce a concept of directional Pareto efficiency for constrained set-valued optimization problems and we derive some optimality conditions with respect to it, both on primal and dual spaces. We rely on some openness properties for epigraphical mappings that we propose and prove, and also on a version of the Ekeland Variational Principle that we adapted to fit to our framework.

Carleman inequalities in L^q. Stability source estimates in inverse parabolic problems

Elena-Alexandra MELNIG
"Alexandru Ioan Cuza" University, Iaşi, Romania
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We consider coupled parabolic systems with homogeneous boundary conditions. We establish a family of L^q Carleman inequalities and use them to obtain stability estimates in L^q norms for the source in terms of the solution in a subdomain.

Proportional boundary stabilizers for parabolic equations

Ionuţ MUNTEANU
"Alexandru Ioan Cuza" University, Iaşi, Romania
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Here we shall discuss about how to design simple, finite-dimensional, linear feedback stabilizers, with boundary actuation, for some parabolic type equations.

Contact CR submanifolds in S^7

Marian Ioan MUNTEANU
"Alexandru Ioan Cuza" University, Iaşi, Romania
munteanu@uaic.ro

We give some new examples of contact CR submanifolds in the seven dimensional Sasakian sphere and recall also some already known results.

Trajectories in 3-dimensional manifolds

Ana Irina NISTOR
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This presentation includes a brief selection of results we obtained so far in the study of magnetic curves in 3-dimensional manifolds as well as some future work. We investigate the magnetic curves in Sasakian and cosymplectic manifolds. In particular, we generalize the classification of magnetic curves in product spaces of type $M^2_\varkappa \times \mathbb{R}$, as it was already done in $\mathbb{S}^2 \times \mathbb{R}$, $\mathbb{H}^2 \times \mathbb{R}$ and Euclidean space $\mathbb{E}^3$. Concerning the magnetic curves in quasi-Sasakian manifolds, we approached the problem in the 3-dimensional case, as it is well known that the geometry of quasi-Sasakian 3-manifolds is rather special, the arbitrary dimensions case remaining still open.

Solving the non-linear multi-index transportation problem with concave cost functions

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We formulate the multi-index nonlinear transportation problem with the concave cost functions. The multi-index transportation problem describes very well the activity of an enterprise, which attracts attention of researchers, because the problem assumes that the capacities of the sources, the demands of the destinations to be supplied, the types and quantities of products and the types and capacities of the transports are

known. We describe an algorithm for solving the non-linear problem and bring a practical example that demonstrates the correctness of the algorithm.

Sufficient criteria for obtaining Hardy inequalities on Finsler manifolds

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We establish Hardy inequalities involving a weight function on complete, not necessarily reversible Finsler manifolds. We prove that the superharmonicity of the weight function provides a sufficient condition to obtain Hardy inequalities.

Algebraic Heun Operators

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We are interested to find algebraic solutions for the Heun operators. We see these solutions as pull-backs by Belyi functions of algebraic hypergeometric operators. We search for these functions by finding their corresponding dessin d'enfant. We find some infinite families of dessins d'enfants parametrized by the number of edges.

Backward stochastic dynamics driven by an unbounded subdifferential operator on a filtered probability space

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The aim of the present article is to cover an important gap from the part of the comprehensive study of Bensoussan, Li and Yam [Backward stochastic dynamics with a subdifferential operator and non-local parabolic variational inequalities] which deals with unique existence of the solution of backward stochastic variational dynamics,

considered on a general complete filtered probability space, in the spirit of Liang, Lyons and Qian [Backward stochastic dynamics on a filtered probability space]. More precisely, the condition imposed for the multivalued operator driven the equation is so restrictive such that, basic examples like obstacle problems are not covered by the authors. We consider more appropriate assumptions for the subdifferential operator and its perturbating term, allowing important classes of multivalued backward stochastic dynamics - even with oblique reflection - to be addressed by the new càdlàg setup.

On a class of linear relations in Hilbert spaces

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Assume that H and K are two real or complex Hilbert spaces, A a linear relation from H to K and B a linear relation from K to H, respectively. Necessary and sufficient conditions for B to be equal to the adjoint of A are provided. Several consequences are also presented. More precisely, new characterizations for closed, skewadjoint, selfadjoint, normal linear relations and generalized orthogonal projections are obtained.

Approximating the solutions of measure differential inclusions

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The possibility to approximate the solutions of a set-valued differential problem driven by a measure by solutions of differential inclusions driven by smoother measures is considered. The key tool is the notion of uniform bounded ε-variation, combining the bounded variation condition with the supremum norm. The generality of the announced results is shown by several examples.

The class equation in complete hypergroup theory

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In this paper, the class equation within the theory of complete hypergroups it is presented. Also, the center and the centralizer of an element for reversible regular hypergroups are analyzed using complete parts.

A nonlinear PDE system describing a network of neurons with Poisson-spiking mechanism

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We present a nonlinear PDE system describing a network of neurons with Poisson-spiking mechanism. The stationary solution and the long time behavior of the system are analyzed and numerical simulations of the model are presented.
