

# PROGRAM

## *MATTRIAD'2015*

September 7 – 11, 2015

Department of Mathematics

University of Coimbra

Portugal

Sponsored by:

The International Linear Algebra Society – ILAS

Department of Mathematics, University of Coimbra – DMUC

Centre for Mathematics, University of Coimbra – CMUC

Center for R&D in Mathematics and Applications – CIDMA

Center for Mathematical Analysis, Geometry and Dynamical Systems – CAMGSD

Center for Functional Analysis, Linear Structures and Applications – CEAFEL

Instituto Politécnico de Tomar – IPT

Fundação para a Ciência e a Tecnologia – FCT

Programa Operacional Factores de Competitividade – COMPETE

Quadro de Referência Estratégica Regional – QREN

Fundo Europeu de Desenvolvimento Regional – União Europeia

## Monday - September 7, 2015<sup>1</sup>

08.15 – 09.00	Registration
09.00 – 09.15	Opening Ceremony
09.15 – 10.00	<i>Numerical solution of matrix equations arising in control of bilinear and stochastic systems</i> Invited Speaker: <b>Peter Benner</b> Chair: João Queiró
10.00 – 11.15	<i>Adjacency Preservers- Part I</i> Invited Lecturer: <b>Peter Šemrl</b> Chair: João Queiró
11.15 – 11.45	Coffee Break
11.45 – 13.00	<i>Adjacency Preservers - Part II</i> Invited Lecturer: <b>Peter Šemrl</b> Chair: João Queiró
13.00 – 14.30	Lunch
14.30 – 16.10	Parallel Sessions
16.10 – 16.40	Coffee Break
16.40 – 18.20	Parallel Sessions

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<sup>1</sup>Plenary sessions are in room 17 de Abril

# Parallel Sessions

## Room 17 de Abril

### IMS 9: Statistical models with matrix structure

Chair: Miguel Fonseca

- 14.30 – 14.50 *New concept of OBS for mixed models*  
**João Mexia**
- 14.50 – 15.10 *Contribute on mixed linear models-simultaneous diagonalization of the variance – covariance matrices*  
**Adilson Silva**
- 15.10 – 15.30 *Approximation with Kronecker product structure with one component as compound symmetry matrix*  
**Katarzyna Filipiak**
- 15.30 – 15.50 *Test for covariance matrix with use of spectral moments*  
**Jolanta Pielaszkiewicz**

### IMS 8: Statistical inference

Chair: Dário Ferreira

- 16.40 – 17.00 *Point estimation in mixed models*  
**Dário Ferreira**
- 17.00 – 17.20 *Global confidence regions for mixed models assuming orthogonal block structure and normality*  
**Sandra Ferreira**
- 17.20 – 17.40 *Joining segregated models with commutative orthogonal block structure*  
**Carla Santos**
- 17.40 – 18.00 *Stability of the relative relevances*  
**Cristina Dias**

## Room Pedro Nunes

### IMS 3: Algebraic methods in operator theory

Chair: Marek Ptak

- 14.30 – 14.50 *On the hyper- and 2- hyperreflexivity of power partial isometries*  
**Marek Ptak**
- 14.50 – 15.10 *Non-self-adjoint graphs*  
**David Krejčířík**
- 15.10 – 15.30 *Structured pseudospectra of block matrices*  
**Jani Virtanen**
- 15.30 – 15.50 *Operator theory on  $C^*$ -algebras via local multipliers*  
**Martin Mathieu**
- 15.50 – 16.10 *Functoriality for the reduced  $C^*$ -algebra of  $GL(n, \mathbb{R})$*   
**Sérgio Mendes**

### IMS 3: Algebraic methods in operator theory

Chair: Cristina Câmara

- 16.40 – 17.00 *Factorization of matrices in  $Q$ -classes*  
**Maria Teresa Malheiro**
- 17.00 – 17.20 *Reflexive spaces of operators*  
**Lina Oliveira**
- 17.20 – 17.40 *From Jacobson's lemma to common spectral properties of operators*  
**Chafiq Benhida**
- 17.40 – 18.00 *Matrix Fourier symbols in problems of wave diffraction by a strip with higher order impedance conditions*  
**Alberto Simões**
- 18.00 – 18.20 *Numerical range of linear pencils with one Hermitian coefficient*  
**Fatemeh E. Taheri**

## Room 2.3

### Section A1: Nonnegative matrices

Chair: Jürgen Garloff

- 14.30 – 14.50 *Sign regular matrices having the interval property*  
**Jürgen Garloff**
- 14.50 – 15.10 *Total nonnegativity of matrices related to polynomial roots and poles of rational functions*  
**Mohammad Adm**
- 15.10 – 15.30 *Connecting sufficient conditions for the symmetric nonnegative inverse eigenvalue problem*  
**Richard Ellard**
- 15.30 – 15.50 *On relation between  $P$ -matrices and regularity of interval matrices*  
**Milan Hladik**
- 15.50 – 16.10 *A canonical construction for nonnegative integral matrices with given line sums*  
**Henrique F. da Cruz**

### Section B1: Matrix computations

Chair: G. Aragón-González

- 16.40 – 17.00 *The generation of all rational orthogonal matrices in  $R^{p,q}$*   
**G. Aragón-González**
- 17.00 – 17.20 *Reduced differential transform method for nonlinear KdV type equations*  
**Yildiray Keskin**
- 17.20 – 17.40 *Preservers of local invertibility and local spectra of matrices*  
**Mohamed Bendaoud**
- 17.40 – 18.00 *Accurate computation of the pseudoinverse of strictly totally positive matrices*  
**Ana Marco**

## Room 2.5

### Section A2: Banded and block matrices

Chair: Durmus Bozkurt

- 14.30 – 14.50 *Integer powers of certain complex pentadiagonal Toeplitz matrices*  
**Durmus Bozkurt**
- 14.50 – 15.10 *Banded matrices with banded inverses and parallel computations*  
**Waldemar Holubowski**
- 15.10 – 15.30 *Idempotent preservers of infinite matrices*  
**Roksana Słowik**
- 15.30 – 15.50 *New estimations for the inverse of some special block matrices in the Euclidean matrix norm*  
**Ksenija Doroslovački**
- 15.50 – 16.10 *Powers of certain complex tridiagonal matrices*  
**Hatice Duru**

### Section B2: Operators, norms and matrix inequalities

Chair: Rute Lemos

- 16.40 – 17.00 *Boundary value problem for second-order differential operators with integral boundary conditions*  
**Ouassila Zibouche**
- 17.00 – 17.20 *Transformations preserving norms of means of positive operators*  
**Patricia Szokol**
- 17.20 – 17.40 *On the convexity of Heinz means and unitarily invariant matrix norms*  
**Zübeyde Ulukök**
- 17.40 – 18.00 *Some inequalities and Schur complements of block Hadamard product*  
**Mustafa Özel**

## Tuesday - September 8, 2015<sup>2</sup>

- 09.00 – 09.45 *Radii of elements in finite-dimensional power-associative algebras*  
Invited Speaker: **Moshe Goldberg**  
Chair: Heike Faßbender
- 09.45 – 10.30 *Inverse eigenstructure problems for matrix polynomials*  
Invited Speaker: **Froilán M. Dopico**  
Chair: Heike Faßbender
- 10.30 – 11.00 Coffee Break
- 11.00 – 11.45 *H-matrix theory and applications*  
Invited Speaker (Young Scientist Awards of MatTriad'2013): **Maja Nedović**  
Chair: Thomas Laffey
- 11.45 – 12.05 *Notes on some spectral radius and numerical radius inequalities*  
**Fuad Kittaneh**  
Chair: Thomas Laffey
- 12.05 – 12.25 *Permutation matrices, doubly stochastic matrices and their L- rays*  
**Geir Dahl**  
Chair: Thomas Laffey
- 12.25 – 12.45 *Isometries of Grassmann spaces*  
**Györg Pál Gehér**  
Chair: Thomas Laffey
- 12.45 – 14.30 Lunch
- 14.30 – 16.10 Parallel Sessions
- 16.10 – 16.40 Coffee Break
- 16.40 – 18.00 Parallel Sessions

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<sup>2</sup> Plenary sessions are in room 17 de Abril

## Parallel Sessions

### Room 17 de Abril

#### IMS 8: Statistical inference

Chair: Luís Grilo

- 14.30 – 14.50 *The exact and near-exact distributions for the statistic used to test the reality of covariance matrix in a complex normal distribution*  
**Luís Grilo**
- 14.50 – 15.10 *A new approximation to the product distribution of beta independent and identically distributed random variables*  
**Rui Alberto**
- 15.10 – 15.30 *The exact distribution of the total median and the total range statistics*  
**Fernanda Figueiredo**
- 15.30 – 15.50 *Inference for bivariate integer-valued moving average models*  
**Isabel Silva**
- 15.50 – 16.10 *Multivariate time series analysis: a study on the relation between imports, exports and economic growth*  
**Eliana Costa e Silva**

#### IMS 8: Statistical inference

Chair: Célia Nunes

- 16.40 – 17.00 *Mixed models with random sample sizes: Observations failures*  
**Célia Nunes**
- 17.00 – 17.20 *Hierarchical cluster analysis of cyanophyta phytoplankton variables in Dammed Water Bodies*  
**Aldina Correia**
- 17.20 – 17.40 *A principal components analysis of environmental variables of the water column in reservoirs*  
**Isabel Cristina Lopes**

#### Poster Presentation

- 17.40 – 18.00 *Knowledge about pediatric high blood pressure*  
**Filomena Teodoro**



## Room Pedro Nunes

### IMS 6: Functions of matrices

Chair: Pedro Freitas

- 14.30 – 14.50 *Supercaracter theories for algebra groups defined by involutions*  
**Pedro Freitas**
- 14.50 – 15.10 *On the norm of the derivatives of symmetric tensor powers*  
**Sónia Carvalho**
- 15.10 – 15.30 *Corona problems, matrix factorization and truncated Toeplitz operators*  
**M. Cristina Câmara**
- 15.30 – 15.50 *More on the Hankel Pencil Conjecture*  
**Alexander Kovačec**
- 15.50 – 16.10 *On the inverse field of values problem*  
**Ana Nata**

### IMS 8: Numerical and combinatorial methods

Chair: Fernando Carapau

- 16.40 – 17.00 *One-dimensional model of fluids of third grade in straight tubes with constant radius*  
**Fernando Carapau**
- 17.00 – 17.20 *On a modified log-conformation formulation of traceless variant of Oldroyd-B viscoelastic model*  
**Marília Pires**
- 17.20 – 17.40 *Hybrid chaotic systems*  
**Ana Isabel Santos**
- 17.40 – 18.00 *Markov chains and mechanical systems*  
**Luís Bandeira**

## Room 2.3

### Section C: Matrix equations

Chair: Manideepa Saha

- 14.30 – 14.50 *Iterative method for linear system with coefficient matrix as an  $M_V$ -matrix*  
**Manideepa Saha**
- 14.50 – 15.10 *A wider convergence area for the MSTMAOR iteration methods for LCP*  
**Ernest Šanca**
- 15.10 – 15.30 *Centrohermitian and skew-centrohermitian solutions to a pair of quaternion matrix equations  $(AXB, DXE) = (C, F)$*   
**Sinem Şimşek**
- 15.30 – 15.50 *A matricial description of improved computation of the Bernstein coefficients and a convexity test for polynomials*  
**Jihad Titi**
- 15.50 – 16.10 *A meshless method of lines with Lagrange interpolation polynomials for the numerical solutions of Burger's Fisher equation*  
**Yildiray Keskin**

### Section D: Miscellanea

Chair: Celeste Gouveia

- 16.40 – 17.00 *Linear systems with singular  $g$ -circulant matrices*  
**Celeste Gouveia**
- 17.00 – 17.20 *On the componentwise product of totally non-negative, structured matrices generated by functions in the Laguerre-Pólya class*  
**Prashant Batra**
- 17.20 – 17.40 *Ordering matrices with some nonnegativity properties*  
**Alicia Herrero**
- 17.40 – 18.00 *About the number of characteristic subspaces*  
**M. Eulalia Montoro**

## Wednesday - September 9, 2015<sup>3</sup>

- 09.00 – 09.45     *Generic low rank perturbations of structured matrices*  
Invited Speaker: **Christian Mehl**  
Chair: Moshe Goldberg
- 09.45 – 11.00     *Matrices and the European parliament - Part I*  
Invited Lecturer: **Friedrich Pukelsheim**  
Chair: Moshe Goldberg
- 11.00 – 11.25     Coffee Break
- 11.25 – 12.40     *Matrices and the European parliament - Part II*  
Invited Lecturer: **Friedrich Pukelsheim**  
Chair: Simo Puntanen
- 12.40 – 13.00     *On the lengths of generating sets of matrix algebras*  
**Thomas Laffey**  
Chair: Simo Puntanen
- 13.00 – 14.30     Lunch
- 14.30 – 18.30     Excursion

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<sup>3</sup> Plenary sessions are in room 17 de Abril

## Thursday - September 10, 2015<sup>4</sup>

09.00 – 09.45	<i>Joint numerical range and numerical shadow</i> Invited Speaker: <b>Karol Życzkowski</b> Chair: Froilán Dopico
09.45 – 10.30	<i>The likelihood ratio test in bilinear models</i> Invited Speaker: <b>Dietrich von Rosen</b> Chair: Froilán Dopico
10.30 – 11.00	Coffee Break
11.00 – 11.45	<i>Computational complexity and interval Linear Algebra</i> Invited Speaker (Young Scientist Awards of MatTriad'2013): <b>Jaroslav Horáček</b> Chair: Fernando de Terán
11.45 – 12.05	<i>On the relative linear sufficiency</i> <b>Simo Puntanen</b> Chair: Fernando de Terán
12.05 – 12.50	<i>Eigenvalues, multiplicities and graphs: recent advances and open questions</i> <b>Charles Johnson</b> Chair: Natália Bebiano; Special Session in memoriam of Glória Cravo
12.50 – 13.00	Photo Group
13.00 – 14.30	Lunch
14.30 – 16.10	Parallel Sessions
16.10 – 16.40	Coffee Break
16.40 – 18.20	Parallel Sessions
20.00	Conference Dinner including a 40 minutes concert played by the group <i>Quarteto Santa Cruz de Coimbra</i> and Joana Neto. Concert program: <ul style="list-style-type: none"><li>• PUCCELL - SUITE Abdelazer</li><li>• VIVALDI - CESSATE, OMAI CESSATI</li><li>• HAENDEL LASCIA CHIO PIANGA</li></ul> Chant: Joana Neto Violins: António Ramos and Clara Dias Violet: Ricardo Mateus Violoncello: Rogério Peixinho

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<sup>4</sup> Plenary sessions are in room 17 de Abril

## Parallel Sessions

### Room 17 de Abril

#### IMS 2: Spectral graph theory

Chair: Domingos Cardoso

- 14.30 – 14.50 *In search of graphs with uniform rank spread two*  
**Irene Sciriha**
- 14.50 – 15.10 *On a conjecture for the distance Laplacian matrix*  
**Maria Agueiras de Freitas**
- 15.10 – 15.30 *The spectrum of an I – graph.*  
**Cybele Vinagre**
- 15.30– 15.50 *Importance of a special class of Jordan subspaces in the synchrony phenomenon of networks*  
**Célia Moreira**
- 15.50 – 16.10 *Adjacency and Laplacian spectra of powers of lexicographic products of graphs*  
**Paula Carvalho**

#### IMS 2: Spectral graph theory

Chair: Domingos Cardoso

- 16.40 – 17.00 *Randić spectra of the H-join graph and Randić energy of graphs with clusters*  
**Helena Gomes**
- 17.00 – 17.20 *Determination of regular exceptional graphs by  $(\kappa, \tau)$ -extensions*  
**Inês Barbedo**
- 17.20 – 17.40 *On trees with non-main least eigenvalue*  
**Francisca França**
- 17.40 – 18.00 *Limit points for the second largest eigenvalues of  $H_{p,q}$  graphs*  
**André Brondani**

## Room Pedro Nunes

### IMS 1: Linearizations and $\ell$ -ifications of matrix polynomials

Chair: Christian Mehl

- 14.30 – 14.50 *On the inverse eigenvalue problem for  $T$ -alternating and  $T$ -palindromic matrix polynomials*  
**Christian Mehl**
- 14.50 – 15.10 *Quasi-Canonical Forms for Matrix Polynomials*  
**Steven Mackey**
- 15.10 – 15.30 *Generalization of Newton linearization for polynomial equations described by Birkhoff data*  
**Nikta Shayanfar**
- 15.30 – 15.50 *Constructing strong  $\ell$ -ifications*  
**Fernando de Terán**
- 15.50 – 16.10 *Structured backward error analysis of polynomial eigenvalue problems solved by linearization*  
**Piers Lawrence**

### IMS 8: Numerical and combinatorial methods

Chair: Manuel Branco

- 16.40 – 17.00 *Some results on the Frobenius coin problem*  
**Manuel Branco**
- 17.00 – 17.20 *Numerical semigroups and interval maps*  
**Sara Fernandes**
- 17.20 – 17.40 *Complete synchronization and delayed synchronization for different couplings*  
**Clara Grácio**
- 17.40 – 18.00 *Growing stochastic matrices and ontogenesis of dynamical systems*  
**Carlos Ramos**

## Room 2.3

### Section E: Miscellanea

Chair: Helena Šmigoc

- 14.30 – 14.50 *Positive coefficients of power series related to the spectral gap*  
**Helena Šmigoc**
- 14.50 – 15.10 *Graphs that allow all the eigenvalue multiplicities to be even*  
**Polona Oblak**
- 15.10 – 15.30 *An alternative canonical form for  $H$ -orthogonal matrices*  
**D. B. Janse van Rensburg**
- 15.30 – 15.50 *A short survey of the Sanov Problem and its alterations*  
**Piotr Ślanina**
- 15.50 – 16.10 *The generalized quadraticity of linear combination of two commuting quadratic matrices*  
**Tuğba Petik**

### IMS 7: Linear preserver problems

Chair: Henrique Cruz

- 16.40 – 17.00 *On linear maps that convert singular matrices to matrices in the zero set of an immanant*  
**Rosário Fernandes**
- 17.00 – 17.20 *Commutativity preserving maps*  
**Gregor Dolinar**
- 17.20 – 17.40 *Immanants of doubly stochastic matrices.*  
**Maria Antónia Duffner**
- 17.40 – 18.00 *Frobenius endomorphisms and the determinantal range*  
**Graça Soares**
- 18.00 – 18.20 *Conditions for a decomposable symmetric tensor associated with a spherical function to be zero*  
**Carlos Gamas**

## Room 2.5

### **Section F: Algorithms and matrix equations**

Chair: Rui Ralha

- |               |   |
|---------------|---|
| 16.40 – 17.00 | <i>On orthogonal integrators for isospectral flows</i><br><b>Rui Ralha</b>  |
| 17.00 – 17.20 | <i>Structured matrices and high relative accuracy</i><br><b>Álvaro Barreras</b>                                       |
| 17.20 – 17.40 | <i>A numerical solution for a telegraph equation using Bernstein polynomials technique</i><br><b>Dounia Belakroum</b> |
| 17.40 – 18.00 | <i>Semi-active damping optimization using the parametric dominant pole algorithm</i><br><b>Zoran Tomljanovic</b>      |



## Friday - September 11, 2015<sup>5</sup>

09.00 – 09.45	<i>Inference in linear mixed models and Jordan algebra</i> Invited Speaker: <b>Roman Zmyślony</b> Chair: Karol Życzkowski
09.45 – 10.30	<i>Matrix pencils completions, combinatorics, and integer partitions</i> Invited Speaker: <b>Marija Dodig</b> Chair: Karol Życzkowski
10.30 – 11.00	Coffee Break
11.00 – 12.40	Parallel Sessions
12.40 – 14.20	Lunch
14.20 – 15.40	Parallel Sessions
15.40 – 16.00	<i>Linear Algebra in Portugal</i> <b>José Vitória</b>
16.00 – 16.15	Closing Ceremony
16.15	Visit to the “Paço das Escolas”

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<sup>5</sup> Plenary sessions are in room 17 de Abril

## Parallel Sessions

### Room 17 de Abril

#### IMS 2: Spectral graph theory

Chair: Domingos Cardoso

- 11.00 – 11.20 *Effects on some graph invariants by adding edges among the vertices of clusters*  
**Oscar Rojo**
- 11.20 – 11.40 *Ky Fan theorem applied to Randić energy*  
**Enide Andrade**
- 11.40 – 12.00 *Integral graphs with at most two vertices of degree larger than 2*  
**Leonardo Lima**
- 12.00 – 12.20 *The  $k$ -regular induced subgraph problem for  $k=1,2$*   
**Sofia Jorge Pinheiro**
- 12.20 – 12.40 *Distance Laplacian and distance signless Laplacian integral graphs*  
**Maria Agueiras de Freitas**

#### IMS 4: Coding theory

Chair: Diego Napp

- 14.20 – 14.40 *The fast correlation attack to linear feedback shift registers as a syndrome decoding problem via representation technique*  
**Alicia Roca**
- 14.40 – 15.00 *Superregular matrices with applications to convolutional codes*  
**Paulo Almeida**
- 15.00 – 15.20 *On MDR codes over a finite ring*  
**Mohamed El Qued**
- 15.20 – 15.40 *Column distances for convolutional codes over finite rings*  
**Marisa Toste**

## Room *Pedro Nunes*

### IMS 5: Matrix theory, applications and engineering

Chair: Marko Stošić

- 11.00 – 11.20 *Equiangular tight frames, and beyond*  
**Marko Stošić**
- 11.20 – 11.40 *On some matrix optimization problems arising in computer vision*  
**João Cardoso**
- 11.40 – 12.00 *Low rank approximations in computer vision*  
**João Paulo Costeira**
- 12.00 – 12.20 *Distributed processing for multi-agent systems*  
**João Xavier**
- 12.20 – 12.40 *On classical modal control of quadratic systems*  
**Ion Zaballa**

### IMS 1: Linearizations and $\ell$ -ifications of matrix polynomials

Chair: Susana Furtado

- 14.20 – 14.40 *Hermitian linearizations of Hermitian matrix polynomials preserving the sign characteristic*  
**Susana Furtado**
- 14.40 – 15.00 *A framework for spectrally equivalent matrix polynomials in non-standard representations*  
**Steven Mackey**
- 15.00 – 15.20 *Linearizations of rational function matrices*  
**Ion Zaballa**

## Room 2.3

### Section G: Linera algebra in statistics

Chair: Augustyn Markiewicz

- 11.00 – 11.20 *Matrix methods in sufficiency problem*  
**Augustyn Markiewicz**
- 11.20 – 11.40 *A graphical-based approach for fault detection in a cement rotary kiln system*  
**Abdelmalek Kouadri**
- 11.40 – 12.00 *Efficiency of the improved estimators with stochastic restrictions under balanced loss in linear regression models*  
**Manoj Kumar**
- 12.00 – 12.20 *Special variance structures and orthogonal transformations*  
**Ivan Žežula**

### IMS 8: Statistical inference

Chair: Teresa Oliveira

- 14.20 – 14.40 *Hadamard matrices on information theory*  
**Carla Francisco**

### IMS 9: Statistical models with matrix structure

Chair: Miguel Fonseca

- 14.40 – 15.00 *Best unbiased estimators for doubly multivariate data*  
**Arkadiusz Koziol**
- 15.00 – 15.20 *To be announced*  
**Francisco Carvalho**
- 15.20 – 15.40 *To be announced*  
**Ricardo Covas**