

Research Report 2007
Department of Mathematics
Instituto Superior Técnico
Portugal

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Preface

The Department of Mathematics regards the annual publication of this research report as an important instrument of scientific policy. On the seventeenth year of its publication we reassert the original goals. The report fulfills simultaneously two complementary purposes. Internally, it highlights the research publications by department members and their involvement in international scientific exchange as a public statement of the importance we attach to them. Externally, it provides information to interested people outside the department about our current research work. Reflecting the scientific activity developed by its members, the research report is a helpful way of assessing the level of achievement of the objectives embraced by the department. These include the pursuit of internationalization as a way to achieve recognition as a mathematics research department.

The Department of Mathematics has at present 106 members holding Ph.D. degrees and is the largest mathematics department in the country. All information regarding the department and its own graduate and undergraduate programs is available through the Internet (<http://www.math.ist.utl.pt>).

The department experienced a fast development since it embraced the goal of becoming a research department more than 20 years ago. Its members obtained Ph.D. degrees from a diversified group of leading universities in mathematics while their relative youth accounts for an energetic environment and provides a good opportunity for innovative and challenging research projects. New challenges and opportunities arose with the collaboration agreements between the Portuguese Government and the Carnegie Mellon University, University of Texas at Austin, École Polytechnique Fédérale de Lausanne of which the Mathematics Department is a partner. We believe that these agreements will increase the internationalization of research and post-graduate programs.

The research centers that involve the department members are regularly subjected to external international reviews within the overall Research Units Assessment scheme established, at internal level, by the Science and Technology Foundation, the public agency responsible for promoting, funding and evaluating research in Portugal. The research centers related to our department are highly rated, acknowledging the high international value of the research performed. The organization of this report reflects the activities of the centers associated to our department, and, therefore, we have decided to include in this Report, without any change, the annual reports of the research centers associated to the department, supplemented with a report describing the activities of members of the department not currently members of research centers associated with the Department of Mathematics.

We would like to thank everyone who was involved in the organization of this issue. We are particularly grateful to Margarida Silva Carvalho for her work in the compilation of information and LATEX processing of this issue.

1 Organizations and activities

The research activity mentioned above is developed in the following main areas:

Dynamical Systems and Differential Equations

The dominant research in this area falls within the general field of mathematical analysis with an emphasis on nonlinear problems whose interest in applications is well known. The activities cover the following subjects: dynamical systems and ergodic theory, ordinary, partial and functional differential equations, calculus of variations and optimization, geometric, topological and algebraic methods in nonlinear analysis, control theory and mechanics of continuous media. The research follows five lines of work: qualitative theory of dynamical systems; geometric mechanics and Hamiltonian systems; methods of nonlinear analysis in mechanics of continuous media; methods of nonlinear systems analysis in control theory; ergodic theory and dynamical systems.

Geometry and Topology

The work in these areas addresses several topics which can be divided into five main fields as follows: i) symplectic geometry, including the study of topological invariants of groups of symplectomorphisms, presymplectic invariants, Poisson manifolds and Hamiltonian circle actions; ii) algebraic geometry, covering the theory of algebraic curves and surfaces, moduli of instantons and vector bundles, spaces of algebraic cycles and pluricanonical maps to projective space; iii) algebraic topology, including elliptic cohomology, algebraic K-theory, equivariant homotopy theory and homological algebra; iv) differential geometry, involving Lie groupoids and algebroids, Kähler geometry, geometric quantization, gerbes, noncommutative geometry and infinite dimensional differential geometry; v) discrete geometry, with emphasis on oriented matroids and arrangements of hyperplanes. The research in geometry and topology also addresses applications to problems motivated from areas of mathematical-physics such as general relativity, symmetries of dynamical systems, Yang-Mills and Chern-Simons theory, string theory and quantum topology.

Operator Theory and Integral Equations

The work in this area is focused on classes of linear operators like Toeplitz, Carleman-Shift singular integral operators and pseudo-differential operators. Current problems under investigation include factorization of (semi)-almost periodic matrix-valued symbols, diffraction problems with approximate boundary conditions of arbitrary order, normalizations problems, symbol calculi, index theory and methods for classes of convolution type operators. C^* algebras of operators on Hardy and Bergman spaces and invertibility theory for non local C^* algebras are other research topics. Applications of the above topics to elliptic boundary-value problems, in particular, problems in diffraction theory are being studied. Applications to other problems in Mathematical Physics such as integrable systems are also of interest to members of the research group.

Probability, Statistics and Applications

The research in this general area has focused on queuing theory and quality control, multivariate analysis, stochastic optimization, categorical data analysis and statistical inference. In queuing theory and quality control interest is concentrated on order relations, transient behavior, threshold problems, and on control charts. In the area of multivariate analysis, topics of interest are factor analysis and related models, multidimensional scaling and discriminant analysis. Particular attention is given to the study of the robustness of these methods. In categorical data analysis and statistical inference, emphasis has been given to incomplete data and statistical theory advanced topics relying on measure and integration.

Numerical Analysis and Applications in Continuum Mechanics

Research in this area has been focused on mathematical and numerical problems in differential and integral equations with applications in continuum mechanics. More precisely:

- (i) mathematical and numerical analysis of models in haemodynamics, analysis of the motion of rigid bodies in viscous fluids, analysis of thin flows in lubrication and oceanography;
- (ii) singular boundary value problems for second order nonlinear ordinary differential equations, mathematical analysis and numerical methods for Volterra integral equations with singular kernels;
- (iii) mathematical and numerical analysis for direct and inverse problems in acoustic and elastic scattering, meshless methods for partial differential equations.

Logic and Computation

Research in this area is concentrated on four main topics: (i) abstract deductive systems, with emphasis on analysis and synthesis of logic systems, including modal logic, hybrid logic, paraconsistent logic, observational logic, probabilistic logic, algebraic logic, higher-order logic and categorical logic, with applications in knowledge representation, software engineering and security; (ii) probabilistic and quantum computation and information, including probabilistic models of computation, quantum computation and quantum cryptography, with applications in security; (iii) dynamical systems and computational complexity, including digital and analog computation, physical realizability of analog computational classes, recursive functions over the reals, analog characterization of low time complexity classes, links between computational complexity and dynamical systems, neural networks, brain modeling with dynamical systems, and applications in classification of spatial data; (iv) type theory, constructive mathematics and mobile computation, including higher-order logics and type systems applied to constructive mathematics and to provably correct concurrent and distributed mobile systems.

Other Areas

There are also some members of the department working in other areas, including stochastic analysis, operations research or the theory of distributions.

1.1 Research centers

Most of the research activities in the Department are organized in research centers approved and regularly assessed by international evaluation panels (cf. appendices) within a scheme of national scope established by the Science and Technology Foundation, the public agency responsible for promoting, funding and evaluating research in Portugal.

The majority of the Department staff belongs to one of the following Centers:

- Center for Logic and Computation, coordinated by Paulo Mateus, with 19 Ph.D. members.
URL: <http://www.sqig.math.ist.utl.pt/>
- Center for Mathematical Analysis, Geometry, and Dynamical Systems, coordinated by C. Rocha, with 48 Ph.D. members.
URL: <http://www.math.ist.utl.pt/cam/>
- Center for Mathematics and its Applications, coordinated by A. Sequeira, with 48 Ph.D. members and research groups in Operator Theory, Banach Algebras and Applications; Numerical Analysis

and Applications in Continuum Mechanics; Statistics and Stochastic Processes; Harmonic Analysis, Operator Theory and Applications.

URL: <http://www.math.ist.utl.pt/cma/>

Other Centers, mainly based on researchers of other departments, count with one or two members of the Department of Mathematics, namely:

- Center for Mathematics and Fundamental Applications, CMAF (Lisbon University), coordinated by L. Sanchez.

URL: <http://cmf.lmc.fc.ul.pt/>

- Center for Plasma Physics, coordinated by J. T. Mendonça.

URL: <http://cfp.ist.utl.pt/>

- Laboratory of Modeling of Agents, coordinated by Luís Correia

URL: <http://labmag.di.fc.ul.pt/>

- Mathematical Physics Group, Lisbon University, coordinated by J.-C. Zambrini.

URL: <http://gfm.cii.fc.ul.pt/>

- Unit of Marine Technology and Engineering, coordinate by Carlos Guedes Soares

URL: <http://www.mar.ist.utl.pt/uetn/>

1.2 Research seminars

During 2006 the Department of Mathematics at Instituto Superior Técnico ran regular sessions of the following seminars:

- Seminar on Algebra (14 sessions).
Organizers: Gustavo Granja.
- Seminar on Analysis, Geometry, and Dynamical Systems (21 sessions).
Organizer: Luís Barreira.
- Seminar on Applied Mathematics and Numerical Analysis (12 sessions).
Organizer: Pedro Lima.
- Seminar on Functional Analysis and Applications (241 sessions).
Organizer: Frank-Olme Speck.
- Seminar Geometria em Lisboa, (20 sessions).
Organizer: Leonor Godinho.
- Seminar on Logic and Computation (22 sessions).
Organizer: C. Caleiro
- Seminar on Mathematics, Systems and Robotics, in collaboration with ISR (14 sessions).
Organizers: Diogo Gomes and João Xavier (ISR).

- Seminar on Partial Differential Equations (4 sessions).
Organizers: Diogo Gomes.
- Seminar on Probability and Statistics (13 sessions).
Organizer: António Pacheco Pires.
- Seminar on Quantum Computation and Information (17 sessions), in collaboration with the Department of Physics.
Organizer: Ana Maria Martins (Department of Physics) and Paulo Mateus.
- Seminar on Topological Quantum Field Theory Club (12 sessions).
Organizers: José Mourão and Roger Picken.

Colloquium: the department also runs a Colloquium, jointly sponsored by the Center for Logic and Computation, the Center for Mathematical Analysis, Geometry, and Dynamical Systems, and the Center for Mathematics and its Applications, with 5 sessions in 2007. The organizer was Margarida Baía.

1.3 Academic Degrees Awarded in 2007

Doutoramentos/Ph.D.'s

- Maria Helena Coelho Ribeiro, Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 18.12.2007. Thesis: Costumer loss probabilities and other performance measures of regular and oscillating systems. Supervisor: António Pacheco Pires, DM, I.S.T.
- Daniel da Silva Graça, Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 5.9.2007. Thesis: Computability with Polynomial Differential Equations. Supervisor: Manuel Lameiras de Figueiredo Campagnolo, Instituto Superior de Agronomia, UTL. Co-supervisor: Jorge Sebastião de Lemos Carvalhão Buescu, Faculdade de Ciências de Lisboa.
- Maria de Fátima Monteiro Ferreira, Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 12.06.2007. Thesis: Embedding, Uniformization and Stochastic Ordering in the Analysis of Level-Crossing Times and $GI^X/M(n)/c$ Systems. Supervisor: António Pacheco Pires, DM, I.S.T.
- Vitor Diogo da Costa Saraiva, Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 10.05.2007. Thesis: Densidades Médias, Partições de Markov e Rigidez Multifractal. Supervisor: Luis Manuel Gonçalves Barreira, DM, I.S.T.

Mestrados/M.A's/M.S.c.'s

- Catarina Maria Miranda de Sousa Rego, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 9.11.2007. Thesis: *Métodos Robustos de Amostragem em Populações Finitas*, Supervisor: Maria da Conceicao Esperanca Amado, DM, I.S.T.
- Cláudia Margarida Lopes Pascoal, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 9.11.2007. Thesis: *Distribuição Normal Bivariada Truncada com Aplicação ao Estudo de Fluxos de Tráfego de Internet*, Supervisor: Maria do Rosario de Oliveira Silva, DM, I.S.T.

- Ausenda Filipa Rosa Pires, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 7.11.2007. Thesis: *Valor prognóstico da citometria de fluxo ADN no carcinoma do colo do útero*, Supervisor: Giovanni Loiola da Silva, DM, I.S.T.
- Carla Patricia Fernandes dos Santos, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 26.10.2007. Thesis: *Modelo de Regressão Logística no Estudo da Obesidade em Portugal*, Supervisor: Maria da Conceicao Esperanca Amado, DM, I.S.T.
- Bruno Miguel Santos Silva, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 26.10.2007. Thesis: *Estudo do Instante Ótimo de Relocalização*, Supervisor: Claudia Rita Ribeiro Coelho Nunes Philippart, DM, I.S.T.
- Joana Oliveira dos Santos, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 23.10.2007. Thesis: *Induced toric Kähler metrics*, Supervisor: Miguel Tribolet de Abreu, DM, I.S.T.
- Andreia Maria Hortence Gomes, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 10.10.2007. Thesis: *O Problema de Frobenius*, Supervisor: José Luis Martins Borges e Fachada, DM, I.S.T.
- José Nuno Ferreira Maia Pereira, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 10.10.2007. Thesis: *Raciocínio Abduativo sobre Especificações de Agentes*, Supervisor: Maria Paula Antunes Abrantes Gouveia, Co-supervisor: Jaime Arsenio de Brito Ramos, DM, I.S.T.
- Bruno Filipe Araújo Lacerda, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 9.10.2007. Thesis: *Linear-Time Temporal Logic Control of Discrete Event Systems*, Supervisor: Pedro Manuel Urbano de Almeida Lima; DEEC, I.S.T., Co-supervisor: Francisco Miguel Alves Campos de Sousa Dionísio, DM, I.S.T.
- Tiago Lança Matos Sucena de Carvalho, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 9.10.2007. Thesis: *Spatial Types for Concurrency, A Spatial Logic to Specify and Verify Distributed Systems*, Supervisor: Antonio Maria Alarcao Ravara, DM, I.S.T.
- Nelson Alexandre Carvalho de Sousa, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 4.10.2007. Thesis: *Cohomologia Equivariante e Mecânica Quântica supersimétrica*, Supervisor: José Manuel Vergueiro Monteiro Cidade Mourão, DM, I.S.T.
- Iara Cristina Alvarinho Gonçalves, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 3.10.2007. Thesis: *O Grupo Fundamental do Complementar de um Arranjo de Hiperplanos Complexos*, Supervisor: Gustavo Oliveira Granja, DM, I.S.T.
- Tiago Lança Matos Sucena de Carvalho, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 10.10.2007. Thesis: *Spatial Types for Concurrency, A Spatial Logic to Specify and Verify Distributed Systems*, Supervisor: Antonio Maria Alarcao Ravara, DM, I.S.T.
- Ruben Carlos Gonçalves Martins, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 3.10.2007. Thesis: *O Impacto da Modelação na Resolução de Problemas de Satisfação Proposicional*, Supervisor: Maria Inês Camarate Campos Lynce de Faria, DEI, IST, Co-supervisor: Carlos Manuel Costa Lourenço Caleiro, DM, I.S.T.
- Ana Maria Patrício Knopfli, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 2.10.2007. Thesis: *Redundancy in CNF Formulas*, Supervisor: Francisco Miguel Alves Campos de Sousa Dionísio, DM, I.S.T.
- Sílvia Isabel Belo Guerra, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 28.09.2007. Thesis: *Integrabilidade do Fluxo Geodésico num Elipsóide*, Supervisor: José António Maciel Natário, IST, DM, I.S.T.

- André Fernandes Vasconcelos, Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 20.09.2007. Thesis: *Detection of Outer Sound Sources Through Measurements of Amplitude on a Body Surface*, Supervisor: Carlos dos Santos Alves, DM, I.S.T.
- Annabela Pelicano, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 20.07.2007. Thesis: *Factorização de uma Classe de Símbolos Oscilatórios e Problemas de Riemann-Hilbert*, Supervisor: Cristina Câmara, IST, DM, I.S.T.
- Alexandra Maria Pita Mayer da Silva Pereira, Mestrado em Estatística, Instituto Superior Técnico, Universidade Técnica de Lisboa, 19.07.2007. Thesis: *Previsão do Rendimento da Madeira de Eucalyptus Globulus com Base em Espectroscopia Nir*, Supervisor: Maria de Rosário de Oliveira Silva, DM, I.S.T.
- Susana Raquel Carvalho Ferreira, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 28.05.2007. Thesis: *Semiestabilidade de fibrados vectoriais e principais sobre curvas elípticas*, Supervisor: Carlos Florentino, DM, I.S.T.
- Hugo Miguel Fernandes Campos, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 4.05.2007. Thesis: *Sobre o Operador de Jacobi*, Supervisor: Viktor Gregorovich Kravchenko, Faculdade de Ciências e Tecnologia da Universidade do Algarve, Co-supervisor: Amarino Brites Lebre, DM, I.S.T.
- Tânia Cristina Dinis Marques e Silva, Mestrado em Matemática e Aplicações, Instituto Superior Técnico, Universidade Técnica de Lisboa, 17.04.2007. Thesis: *Statistical Models to Predict electricity Prices*, Supervisor: António Manuel Pacheco Pires, DM, I.S.T.
- Paulo Jorge Canas Rodrigues, Mestrado em Estatística, Instituto Superior Técnico, Universidade Técnica de Lisboa, 24.01.2007. Thesis: *Componentes Principais: O método e as suas generalizações*, Supervisor: João António Branco, DM, I.S.T.

New Positions

- Rui Loja Fernandes, Professor Catedrático

2 Appendices

- CAMGSD Research Report, see in <http://camgsd.math.ist.utl.pt/report2007.pdf>
- CEMAT Research Report
- CEAF Reserach Report
- SQIG Research Report
- Other Units



**Center for Mathematical Analysis,
Geometry, and Dynamical Systems**

Report 2007

February 2008

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1 Visitors

The following researchers visited the Center in 2007:

- R. Abgrall, Univ. Bordeaux 1, 23–29.07.07.
- V. Afraimovich, Univ. Autónoma de San Luis Potosi, Mexico, 24–30.06.07.
- O. Akin, Gazi Univ., Turkey, 22–27.07.07.
- D. Alekseevsky, Univ. Edinburgh, UK, 5–8.09.07.
- L. Alsedá, Univ. Autònoma de Barcelona, Spain, 22–28.07.07.
- B. Audoux, Univ. Paul Sabatier, France, 5–8.07.07.
- J. Azcárraga, Univ. Valencia, Spain, 5–10.09.07.
- V. Baladi, Centre National de la Recherche Scientifique, France, 22–28.07.07.
- F. Balibrea, Univ. Murcia, 22–28.07.07.
- F. Barbero, Consejo Superior de Investigaciones Cientificas, Spain, 4–8.09.07.
- A. Bas, Univ. Murcia, Spain, 27–30.11.07.
- M. Benedicks, Royal Institute of Technology, Stockholm, Sweden, 25–30.06.07.
- I. Berg, Univ. Évora, Portugal, 23–24.11.07.
- J. Bloom, Columbia Univ., USA, 5–8.7.07.
- F. Boca, 31.08–5.09.07.
- D. Bonheure, Univ. Louvain-la-Neuve, Belgium, 8–12.07.07.
- V. Bonini, McMaster Univ., Canada, 28.05–3.06.07.
- L. Bunimovich, Georgia Institute of Technology, USA, 9.06–1.07.07.
- M. Bonner, Univ. Missouri, 22–27.07.07.
- A. Bruder, Utah State Univ., USA, 1–31.07.07.
- U. Bruzzo, Scuola Internazionale Superiore di Studi Avanzati, Italy, 3–9.12.07.
- E. Camouzis, The American College of Greece, Greece, 26–29.07.07.
- R. Caseiro, Univ. Coimbra, Portugal, 5–8.09.07.
- P. Cartier, Institut des Hautes Études Scientifiques, France, 4–14.06.07.
- W. Chacholski, KTH, Stockholm, Sweden, 23–27.10.07.
- S. Sun Cheng, Tsing Hua Univ., Taiwan, 20–29.07.07.
- J. Cholewa, Univ. Silesia, Poland, 22–28.01.07.
- C. Ciliberto, Univ. Roma 2, Italy, 31.01–02.02.07.
- R. Cockett, Univ. Calgary, Canada, 23–26.06.07.

J. Colombeau, Univ. Estadual de Campinas, Univ. São Paulo, and Univ. Federal do Rio de Janeiro, Brazil, 23–25.11.07.
J. Cushing, Univ. Arizona, USA, 22–28.07.07.
S. Czerwik, Silesian Univ. Technology, Poland, 22–29.07.07.
M. Dadarlat, Purdue Univ., USA, 05–10.06.07.
F. Dannan, Univ. Qatar, Qatar, 22–29.07.07.
E. D’Aniello, Seconda Università degli Studi di Napoli, Italy, 10.04–3.05.07.
V. Deaconu, Univ. Nevada, Reno, USA, 20–23.05.07.
R. Devaney, Boston Univ., USA, 22–29.07.07.
L. Diogo, Univ. Chicago, USA, 5–8.07.07.
O. Dragulette, Ecole Polytechnique Fédérale de Lausanne, Switzerland, 11–18.06.07.
E. Dryden, Bucknell Univ., USA, 8.05–23.06.07.
M. Efendiev, Technical Univ. Munich, Germany, 28.02–10.03.07.
R. El Harti, Univ. Hassan I, Morocco, 17.05.07.
S. Elaydi, Trinity Univ., USA, 2–31.07.07.
J. Elisseva, Moscow State Univ. Technology, Russia, 20–28.07.07.
E. Farjoun, Hebrew Univ. Jerusalem, Israel, 19–25.04.07.
H. Feller, Univ. Nebraska-Lincoln, USA, 21–28.07.07.
E. Fernandez, Univ. la Laguna, Tenerife, Spain, 4–14.09.07.
B. Fiedler, Freie Univ. Berlin, Germany, 3–11.10.07.
J. Funk, Univ. West Indies, Barbados, 23.06–01.07.07.
S. Gabelli, Univ. Roma 3, Italy, 31.01–02.02.07.
A. Garmendia, Univ. Extremadura, Spain, 5–08.9.07.
H. Geiges, Univ. Cologne, Germany, 11–14.06.07.
V. Gontar, Ben-Gurion Univ., Israel, 22–27.07.07.
A. Grünrock, Univ. Wuppertal, Germany, 30.09–8.10.07.
S. Gukov, Univ. California, USA, 5–8.07.07.
M. Guzowska, Univ. Szczecin, Poland, 22–27.07.07.
B. Hasselblatt, Tufts Univ., USA, 22–29.06.07
M. Hilsun, Centre National de la Recherche Scientifique, France, 5–8.09.07.
M. Jakobson, Univ. Maryland, USA, 24–30.06.07
S. Jansou, Univ. Sciences et Techniques de Languedoc, France, 15.02–3.03.07.
V. Jurdjevic, Univ. Toronto, USA, 5–8.09.07.

A. Kahle, Univ. Texas at Austin, USA, 5–8.07.07.
Y. Kifer, Hebrew Univ. Jerusalem, Israel, 24–30.06.07.
P. Kloeden, Johann Wolfgang Goethe-Univ., Germany, 21–28.07.07.
K. Konno, Univ. Osaka, Japan, 30.10–06.11.07.
Y. Kostrov, Univ. Rhode Island, USA, 21–27.07.07.
D. Krasner, Columbia Univ., USA, 5–8.07.07.
D. Kruml, Masaryk Univ., Brno, Czech Republic, 23–30.06.07.
A. Kumjian, Univ. Nevada, Reno, USA, 03–10.06.07.
J. Ladas, Univ. Rhode Island, USA, 20–29.07.07.
K. Landsman, Radboud Univ. Nijmegen, The Netherlands, 04–07.09.07.
F. Ledrappier, Univ. Notre Dame, USA, 20–30.06.07.
M. Lemos, Univ. Federal de Pernambuco, Brazil, 25.06–07.07.07.
J. Lewandowski, Warsaw Univ., Poland, 5–8.09.07.
S. Leung, Univ. Toronto, Canada, 5–8.07.07.
P. Lima-Filho, Texas A&M Univ., USA, 30.05–15.06.07.
F. Lin, Univ. Southern California, USA, 22–27.07.07.
J. Llibre, Univ. Aut3noma de Barcelona, Spain, 16–18.12.07
A. Lopes, Univ. Federal do Rio Grande do Sul, Brazil, 2–31.01.07.
R. Lu3s, Univ. Madeira, Portugal, 11–24.02.07 and 16–31.07.07.
M. Mal3k, Silesian Univ. Opava, Czech Republic, 22–30.07.07.
J. Mallet-Paret, Brown Univ., USA, 21–28.07.07.
J. Marrero, Univ. La Laguna, Tenerife, Spain, 22–27.07.07 and 4–14.09.07.
J. Martens, Max Planck Institute, Bonn, Germany, 12–17.06.07.
E. Martinez, Univ. Zaragoza, Spain, 4–13.09.07.
M. Martinho, Univ. 3vora, Portugal, 23–27.07.07.
N. Martins, Univ. Aveiro, Portugal, 23–24.11.07.
J. Mawhin, Univ. Catholique de Louvain, Belgium, 22–28.07.07.
R. Medina, Univ. Los Lagos, Chile, 21–28.07.07.
M. Meiler, Technical Univ. Munich, Germany, 22–28.07.07.
H. Melo, Univ. A3ores, Portugal, 21–28.07.07.
F. Mena, Univ. Minho, Portugal, 14.03–31.09.07.
V. Mendes, Instituto Superior de Ci3ncias do Trabalho e da Empresa, Portugal, 23–27.07.07.

J. Merodio, Univ. Politécnica de Madrid, Spain, 4–8.09.07.
M. Migda, Poznan Univ. Technology, Poland, 23–27.07.07.
J. Miguel, Univ. Eduardo Mondlane, Mozambique, 21–28.07.07.
M. Misiurewicz, Indiana Univ. - Purdue Univ. Indianapolis, 2–31.07.07.
A. Moghaddam, Yasuj Univ., Iran, 20–31.07.07.
V. Muñoz, Consejo Superior de Investigaciones Científicas, Spain, 4–8.09.07.
R. Mustapha, Académie de Reims, France, 22–27.07.07.
C. Mulvey, Univ. Sussex and Cambridge Univ., UK, 21.10–03.11.07.
V. Neves, Univ. Aveiro, Portugal, 23–24.11.07.
P. Newstead, Univ. Liverpool, UK, 8–14.10.07.
K. Nishimura, Kyoto Univ., Japan, 22–25.07.07.
J. Nogueira, Univ. Texas at Austin, USA, 5–8.07.07.
R. Nussbaum, State Univ. New Jersey, USA, 22–28.07.07.
E. Oliveira, Univ. Federal do Rio Grande do Sul, Brazil, 6.11.07–28.02.08.
P. Ozsvath, Columbia Univ., USA, 4–9.07.07.
P. Padilla, National Autonomous Univ. Mexico, Mexico, 11–18.03.07.
E. Padron, Univ. La Laguna, Tenerife, Spain, 4–14.09.07.
J. Palis, Instituto Nacional de Matemática Pura e Aplicada, Brazil, 22–24.02.07.
T. Petkova, Columbia Univ., USA, 5– 8.07.07.
M. Pollicott, Univ. Warwick, UK, 24–29.06.07.
R. Pardini, Univ. Pisa, Italy, 10–18.01.07.
F. Paugam, Institut de Mathématiques de Jussieu, France, 25–28.06.07.
A. Peterson, Univ. Nebraska-Lincoln, USA, 22–27.07.07.
A. Pinto, Univ. Porto, Portugal, 24–28.07.07.
D. Ponte, Instituto de Matemáticas y Física Fundamental, Spain, 9–16.02.07 and 4–14.09.07.
N. Pop, Univ. Nord Baia Mare, Romania, 22–27.07.07.
J. Porras, Univ. Salamanca, Spain, 8–12.05.07.
D. Pronk, Dalhousie Univ., Canada, 10–17.06.07.
J. Rasmussen, Princeton Univ., USA, 4–9.07.07.
M. Robnik, Univ. Maribor, Slovenia, 22–26.07.07.
F. Rodríguez Hertz, IMERL, Uruguay, 24.06–1.07.07.

M. Rodríguez-Olmos, École Polytechnique Fédérale de Lausanne, Switzerland, 4–14.02.07.

A. Rodkina, Univ. West Indies, Jamaica, 22–29.07.07.

A. Ruffing, Munich Univ. of Technology, Germany, 19–29.07.07.

D. Ruipérez, Univ. Salamanca, Spain, 8–12.05.07.

R. Sacker, Univ. Southern California, USA, 20–29.07.07.

E. Scmeidel, Poznan Univ. Technology, Poland, 22–29.07.07.

A. Sharkovsky, National Academy of Science of Ukraine, Ukraine, 2–31.07.07.

J. Scherer, Univ. Autònoma de Barcelona, Spain, 20–23.03.07.

J. Schmeling, Lunds Univ., Sweden, 24–30.06.07.

G. Sell, Univ. Minnesota Twin Cities, USA, 20–28.07.07.

S. Senti, Univ. Federal do Rio de Janeiro, Brazil, 23.06–14.08.07

E. Sernesi, Univ. Roma 3, Italy, 31.01–02.02.07.

J. Smital, Silesian Univ. Opava, Czech Rep. 21–28.07.07.

H. Smith, Arizona State Univ., USA, 22–29.07.07.

L. Snoha, Faculty of Natural Sciences, Matej Bel Univ., Slovakia, 19–28.07.07.

A. Sorrentino, Princeton Univ., USA, 8–17.06.07 and 19–26.11.07.

B. Steinberg, Carleton Univ., Canada, 25.06–01.07.07.

S. Stević, Serbian Academy of Sciences and Arts, Serbia, 22–29.07.07

S. Stirling, Univ. of Texas at Austin, USA, 5–8.07.07.

I. Struchiner, Univ. Estadual de Campinas, Brazil, 2–14.07.07.

A. Suhrer, Technical Univ. Munich, Germany, 8–31.07.07.

J. Szász, Budapest Univ. Technology, Hungary, 24–30.06.07.

H. Tehrani, Univ. Nevada, Las Vegas, USA, 1.10–30.11.07.

A.L. Thiel, Univ. Louis Pasteur, France, 5–8.07.07.

R. Thomas, Univ. California, Davis, USA, 5–8.07.07.

P. Tod, Oxford Univ., UK, 14.03–1.04.07.

T. Tokieda, Cambridge Univ., UK, 4–8.09.07.

E. Valdinoci, Univ. Roma 2, Italy, 5–13.05.07 and 15–21.09.07.

A. Vanderbauwhede, Univ. Gent, Belgium, 22–28.07.07.

P. Vieira, Ecole Normale Supérieure, France, 22–25.07.07.

E. Villaseñor, Univ. Carlos III, Spain, 4–8.09.07.

N. Virdee, Univ. Plymouth, UK, 5–8.07.07.

E. Wagner, Univ. Louis Pasteur, France, 5–8.07.07.

2 Seminars

Analysis, Geometry, and Dynamical Systems Seminar. This is the main seminar of the Center. It included the following talks in 2007:

- Hossein Tehrani (Univ. Nevada, Las Vegas), New and old results on semilinear elliptic equations with logistic type nonlinearities and harvesting, 20/11/07.
- Julien Keller (Institute for Mathematical Sciences, Imperial College), Kähler–Ricci flow: infinite and finite dimensional approach, 13/11/07.
- B. Fiedler (Freie Univ. Berlin), Planar attractors of Sturm type: dynamics and graph theory, 9/10/07.
- Axel Grünrock (Univ. Wuppertal), On well-posedness theory for nonlinear wave equations aside from the H^s -scale, 2/10/07.
- Denis Bonheure (Univ. Louvain-la-Neuve), Symmetry breaking in Moser–Trudinger inequalities and a Hénon type problem in dimension two, 10/7/07.
- Frédéric Paugam (Institut de Mathématiques de Jussieu, Paris), A survey of the geometry of the functional equation of Riemann’s zeta function, 28/6/07.
- Frédéric Paugam (Institut de Mathématiques de Jussieu, Paris), Non-commutative geometry and number theoretical dynamical systems, 27/6/07.
- Benjamin Steinberg (Carleton Univ.), Spectral computations for self-similar groups, 26/6/07.
- R. Czaja (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Transversality in scalar reaction-diffusion equations on a circle, 19/6/07.
- Alfonso Sorrentino (Princeton Univ.), On the total disconnectedness of the quotient Aubry set, 12/6/07.
- Marius Dadarlat (Purdue Univ.), Bundles, operator algebras and K -theory, 6/6/07.
- Alex Kumjian (Univ. Nevada, Reno), On Hausdorff measures and KMS states, 5/6/07.
- Rachid El Harti (Univ. Hassan I, Morocco), Operator algebras and amenability, 17/5/07.

- Emma D’Aniello (Seconda Univ. degli Studi di Napoli), Chaos, periodic orbits and ω -limit sets, 24/4/07.
- Messoud Efendiev (Technische Univ. München), On a new class of equations arising in the modelling of biofilms, 6/3/07.
- Jacob Palis (Instituto Nacional de Matemática Pura e Aplicada), A global scenario for chaotic systems from Poincaré to present time, 23/2/07.
- David Iglesias Ponte (Consejo Superior de Investigaciones Científicas), New geometric techniques in mechanics, 13/2/07.
- Gonzalo Contreras (Centro de Investigación en Matemáticas, A.C.), A generic property of families of Lagrangian systems, 8/2/07.
- Artur Lopes (Univ. Federal do Rio Grande do Sul), Holonomic probabilities and ergodic optimization, 30/1/07.
- Jan Cholewa (Univ. Silesia, Katowice), Dissipative equations in locally uniform spaces, 23/1/07.

Algebra Seminar. This included the following talks in 2007:

- J. Ventura (Instituto Superior Técnico), Classifying saturated fusion systems over 2-groups, 5/12/07.
- Wojtek Chacholski (KTH, Stockholm), How to quantify the complexity of fibrations of topological spaces, 22/11/07.
- Sean Lawton (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Minimal affine coordinates for $SL(3, \mathbb{C})$ character varieties of free groups, 11/10/07.
- Mike Paluch (Instituto Superior Técnico), Homotopy spectral sequences, pairing and cap products (II), 27/9/07.
- Mike Paluch (Instituto Superior Técnico), Homotopy spectral sequences, pairing and cap products (I), 17/9/07.
- Robin Cockett (Univ. Calgary, Canada), Applications of restriction categories, 26/6/07.
- David Kruml (Univ. Masaryk, Brno, Czech Republic), Girard couples of quantales, 26/6/07.
- Jonathon Funk (Univ. West Indies, Barbados), Toposes and P -semi-groups, 26/6/07.

- Paulo Lima-Filho (Texas A&M Univ.), Integral Deligne cohomology for real varieties, 11/6/07.
- Emmanuel Dror-Farjoun (Hebrew Univ. Jerusalem), Cellularization in Algebra and Topology, 24/4/07.
- Jérôme Scherer (Univ. Autònoma de Barcelona), Deconstructing Hopf spaces, 22/3/07.
- B. Oliver (Univ. Paris XIII), p -Local compact groups, 27/2/07.
- Luis Pereira (Univ. de Paris VII), How to see that a statement might be undecidable (II), 21/2/07.
- Luís Pereira (Univ. Paris VII), How to see that a statement might be undecidable, 15/2/07.

“Geometria em Lisboa” Seminar. This included the following talks in 2007:

- Ugo Bruzzo (Scuola Internazionale Superiore di Studi Avanzati), Semi-stable and numerically effective principal (Higgs) bundles, 4/12/07.
- Sean Lawton (Instituto Superior Técnico), Obtaining the one-holed torus from pants: duality in an $SL(3, \mathbb{C})$ -character variety, 20/11/07.
- Alessia Mandini (Instituto Superior Técnico), The cohomology ring of polygon spaces: an application of the Duistermaat–Heckman theorem, 6/11/07.
- Kazuhiro Konno (Univ. Osaka), Fibred algebraic surfaces and the localization of signature, 30/10/07.
- Alessia Mandini (Instituto Superior Técnico), The cobordism class and the symplectic volume of the moduli space of polygons in \mathbb{R}^3 , 23/10/07.
- Peter Newstead (Univ. Liverpool), Cliffords theorem for coherent systems, 9/10/07.
- Pedro Frejlich (Instituto Superior Técnico), Nahm transform for Higgs bundles — Part II, 2/10/07.
- Pedro Frejlich (Instituto Superior Técnico), Nahm transform for Higgs bundles, 25/9/07.
- Philippe Monnier (Univ. Paul Sabatier — Toulouse III), Rigidity of group actions on Poisson manifolds, 5/7/07.

- Marcos Alexandrino (Univ. São Paulo), Singular holonomy of singular Riemannian foliations with sections, 3/7/07.
- Johan Martens (Univ. Toronto and Max Plank Institute, Bonn), Equivariant volumes of non-compact quotients and instanton counting, 12/6/07.
- Dorette Pronk (Dalhousie Univ.), Translation groupoids and orbifold Bredon cohomology, 11/6/07.
- Vincent Bonini (McMaster Univ.), A positive mass theorem on asymptotically hyperbolic manifolds with corners along a hypersurface, 29/5/07.
- Daniel Hernández Ruipérez (Univ. Salamanca), Fourier–Mukai transforms for coherent systems on elliptic curves, 10/5/07.
- Markus Pflaum (Frankfurt Univ.), An algebraic index theorem for orbifolds, 10/4/07.
- Ana Cristina Casimiro (Univ. Nova de Lisboa), Mumford’s stability on the Sato grassmannian, 20/3/07.
- Sébastien Jansou (Univ. Montpellier II), Examples of invariant Hilbert schemes, 27/2/07.
- Henrique Bursztyn (Instituto Nacional de Matemática Pura e Aplicada), Pure spinors and moment maps, 12/2/07.
- Miguel Olmos (Ecole Polytechnique Fédérale de Lausanne), Nonlinear stability of Riemann ellipsoids with symmetric configurations, 6/2/07.
- Nuno Romão (Massachusetts Institute of Technology), Spectral curves and the mass of hyperbolic monopoles, 9/1/07.

Mathematical Physics Seminar. This included the following talks in 2007:

- J. Natário (Instituto Superior Técnico), General relativity VII, 22/11/07.
- J. Natário (Instituto Superior Técnico), General relativity VI, 19/11/07.
- J. Natário (Instituto Superior Técnico), General relativity V, 15/11/07
- J. Natário (Instituto Superior Técnico), General relativity IV, 12/11/07.

- J. Natário (Instituto Superior Técnico), General relativity III, 8/11/07.
- Jorge Drumond Silva (Instituto Superior Técnico), Hyperbolic partial differential equations III, 5/11/07.
- J. Natário (Instituto Superior Técnico), General relativity II, 31/10/07.
- Jorge Drumond Silva (Instituto Superior Técnico), Hyperbolic partial differential equations II, 29/10/07.
- J. Natário (Instituto Superior Técnico), General relativity I, 25/10/07.
- Jorge Drumond Silva (Instituto Superior Técnico), Hyperbolic partial differential equations I, 22/10/07.
- Paul Tod (Univ. Oxford), New results in black-hole uniqueness, 28/3/07.
- Paul Tod (Univ. Oxford), Lanczos potentials and a definition of gravitational entropy for perturbed FLRW space-times, 21/3/07.

Mathematics, Systems and Robotics Seminar. In collaboration with Instituto de Sistemas e Robótica. It included the following talks in 2007:

- (December 7)
 - Matthijs Spaan (Instituto Superior Técnico), Planning in partially observable environments.
 - Elismar Oliveira, Generalized Mather problem, viscosity solutions and Mather measures.
- (November 23)
 - Rita Cunha and Carlos Silvestre (Instituto de Sistemas e Robótica), Output feedback control for stabilization on $SE(3)$.
 - Adélia Sequeira (Instituto Superior Técnico), Modeling approach and simulations of blood coagulation dynamics.
- (October 12)
 - Diogo Gomes (Instituto Superior Técnico), New problems in control theory.
 - António Baptista, Tantas “ciências”.

- (June 1)
 - João Almeida (Instituto Superior Técnico), Rational trigonometry applied to robotics.
 - José Maria Gomes (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Geometrical aspects of least energy solutions for some variational problems.
- (April 20)
 - Luis Montesano (Instituto Superior Técnico), Optimal filtering for partially observed point processes using trans-dimensional sequential Monte Carlo.
 - José Félix Costa (Instituto Superior Técnico), Continuous time computation: a constructive approach.
- (March 9)
 - Juha Videman (Instituto Superior Técnico), Introduction to PDEs in geophysical fluid dynamics.
 - Francisco Melo (Instituto Superior Técnico), Reinforcement learning: general overview and some interesting challenges.
- (February 2)
 - Mário Figueiredo (Instituto Superior Técnico), Network inference from co-occurrences.
 - C. Rocha (Instituto Superior Técnico), An introduction to infinite dimensional dynamical systems.

Partial Differential Equations Seminar. This included the following talks in 2007:

- Andrei Biryuk (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Weak solutions of the Navier–Stokes system, singular sets and the question of uniqueness, 28/2/07.
- Andrei Biryuk (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), An abstract nonlinear Cauchy–Kowalewski theorem in a scale of Banach spaces — II, 30/1/07.
- M. Baía (Instituto Superior Técnico), Characterization of two-scale Young measures: application to homogenization, 17/1/07.
- Andrei Biryuk (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), An abstract nonlinear Cauchy–Kowalewski theorem in a scale of Banach spaces, 10/1/07.

String Theory Seminar. This included the following talks in 2007:

- Pedro Vieira (Ecole Normale Supérieure), Integrability and AdS/CFT V, 25/7/07.
- Pedro Vieira (Ecole Normale Supérieure), Integrability and AdS/CFT IV, 25/7/07.
- Pedro Vieira (Ecole Normale Supérieure), Integrability and AdS/CFT III, 24/7/07.
- Pedro Vieira (Ecole Normale Supérieure), Integrability and AdS/CFT II, 24/7/07.
- Pedro Vieira (Ecole Normale Supérieure), Integrability and AdS/CFT I, 23/7/07.
- Rui Lima Matos (Univ. Cambridge), Quantum dispersion of giant magnons II, 17/7/07.
- Rui Lima Matos (Univ. Cambridge), Quantum dispersion of giant magnons I, 17/7/07.

Topological Quantum Field Theory Club. This included the following talks in 2007:

- Ugo Bruzzo (Scuola Internazionale Superiore di Studi Avanzati), Instantons and framed bundles on rational surfaces, 6/12/07.
- Yassir Dinar (Scuola Internazionale Superiore di Studi Avanzati), Algebraic Frobenius manifolds and primitive conjugacy classes in Weyl group, 30/11/07.
- Pierre Cartier (Institut des Hautes Études Scientifiques), New methods in renormalization theories — III, 8/6/07.
- Pierre Cartier (Institut des Hautes Études Scientifiques), New methods in renormalization theories — II, 5/6/07.
- Pierre Cartier (Institut des Hautes Études Scientifiques), New methods in renormalization theories — I, 5/6/07.
- Special sessions: Quantum topology, gerbes and Khovanov homology, 22–23/2/07. Talks by Rui Carpentier (Instituto Superior Técnico), João Faria Martins (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Pedro Lopes (Instituto Superior Técnico), M. Mackaay (Univ. Algarve), Roger Picken (Instituto Superior Técnico), Paulo Semião (Univ. Algarve), M. Stosic (Instituto de Sistemas e Robótica).

Working Seminar on Contact/Symplectic Topology/Geometry. This included the following talks in 2007:

- Stavros Papadakis (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Topology of complex-analytic singularities, 20/11/07, 27/11/07, 04/12/07.
- Julien Keller (Imperial College), Balanced metrics and algebraic geometry, 13/11/07.
- Sheila Sandon (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Maximal tori in the group of contactomorphisms, 06/11/07.
- Sheila Sandon (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Contact toric manifolds, 30/10/07.
- Sheila Sandon (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Group actions on contact toric manifolds, 23/10/07.
- Sheila Sandon (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Generating functions, 08/05/07, 15/05/07, 22/05/07.
- Bart Van Steirteghem (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Simplest projective reductive varieties, 17/04/07, 24/04/07.
- Bart Van Steirteghem (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Representation theory of complex reductive groups, 27/03/07, 03/04/07.
- Sheila Sandon (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Contact Topology: orderability vs. squeezing, 06/03/07, 13/03/07, 20/03/07.

Working Seminar on Groupoids and Noncommutative Geometry. This included the following talks in 2007:

- Rogier Bos (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Topological approaches to groupoid cohomology (part II), 13/12/07.
- Rogier Bos (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Topological approaches to groupoid cohomology, 6/12/07.
- Rogier Bos (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Differentiable groupoid cohomology (part II), 29/11/07.
- Rogier Bos (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Differentiable groupoid cohomology, 22/11/07.

- Dmitry Matsnev (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Étale groupoids as germ groupoids and applications (part III), 15/11/07.
- Dmitry Matsnev (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Étale groupoids as germ groupoids and applications (part II), 8/11/07.
- Dmitry Matsnev (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Étale groupoids as germ groupoids and applications, 25/10/07.
- Alex Kumjian (Univ. Nevada, Reno), The Brauer group of a locally compact groupoid, 6/6/07.
- Radu Popescu (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Calculus of fractions and K -theory for C^* -algebras, 31/5/07.
- Valentin Deaconu (Univ. Nevada, Reno), Groupoids associated to a textile system, 21/5/07.
- Olivier Brahic (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), The restriction functor as a principal bundle, 22/2/07.
- Olivier Brahic (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Introduction to the classification of regular groupoids, 15/2/07.
- Olivier Brahic (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Extensions of Lie algebroids and Lie groupoids II, 8/2/07.
- Olivier Brahic (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), Extensions of Lie algebroids and Lie groupoids I, 1/2/07.
- Radu Popescu (Centro de Análise Matemática, Geometria e Sistemas Dinâmicos), More on Fell bundles, 25/1/07.
- P. Resende (Instituto Superior Técnico), Fell bundles over étale groupoids and their reduced C^* -algebras, 18/1/07.
- P. Resende (Instituto Superior Técnico), Circle extensions of groupoids, reduced C^* -algebras, and MASAS, 11/1/07.

Other seminars. The Center has also contributed to activities of the Department of Mathematics of Instituto Superior Técnico and of other research centers, in particular providing partial support to the Colloquium of the Department of Mathematics and to the Quantum Information and Computation Seminar of the Security and Quantum Information Group of Instituto de Telecomunicações.

3 Conferences and short courses

The following Conferences and Short Courses were organized or co-organized by members of the Center in 2007:

First Iberian Mathematical Meeting

Fundação Calouste Gulbenkian, Portugal, February 9–11, 2007

Plenary speakers:

- José Ferreira Alves (Univ. Porto),
- Manuel Ritoré (Univ. Granada),
- Henrique Bursztyn (Instituto Nacional de Matemática Pura e Aplicada),
- Luis Escauriaza (Univ. País Vasco),
- Luísa Mascarenhas (Univ. Nova de Lisboa),
- Tere M. Seara (Univ. Politècnica de Catalunya).

<http://www.spm.pt/encontroiberico>

The First Quantum Geometry and Quantum Gravity School

Zakopane, Poland, March 23 – April 3, 2007

Plenary speakers:

- Jan Ambjorn (Niels Bohr Institute and Institute for Theoretical Physics)
- Laurent Freidel (Perimeter Institute),
- Etera Livine (École Normale Supérieure, Paris),
- Paweł Kasprzak (Univ. Warsaw),
- Tomasz Pawłowski (Pennsylvania State Univ.),
- Martin Reuter (Johannes Gutenberg-Universität),
- Carlo Rovelli (Centre de Physique Theorique de Luminy),

- Jean-Marc Schlenker (Univ. Toulouse III),
- Thomas Thiemann (Albert Einstein Institute),
- Ruth Williams (Univ. Cambridge).

<http://www.fuw.edu.pl/QGGG1>

VIII Lisbon Summer Lectures in Geometry

Instituto Superior Técnico, Portugal, June 11–14, 2007

Lecturer: Hansjörg Geiges (Univ. Cologne, Germany).

<http://www.math.ist.utl.pt/~sanjos/SummerLectures/SummerLect07>

Nonuniformly Hyperbolic Dynamics and Smooth Ergodic Theory

Instituto Superior Técnico, Portugal, June 25–30, 2007

Speakers:

- Valentin Afraimovich (Univ. Autónoma de San Luis Potosí),
- Michael Benedicks (Royal Institute of Technology, Stockholm),
- Leonid Bunimovich (Georgia Institute of Technology),
- Dmitri Burago (Penn State Univ.),
- Keith Burns (Northwestern Univ.),
- Dmitry Dolgopyat (Univ. Maryland),
- Albert Fathi (École Normale Supérieure de Lyon),
- Boris Hasselblatt (Tufts Univ.),
- Michael Jakobson (Univ. Maryland),
- Vadim Kaloshin (Univ. Maryland and Penn State Univ.),
- Anatole Katok (Penn State Univ.),
- Svetlana Katok (Penn State Univ.),
- Yuri Kifer (The Hebrew Univ. Jerusalem),
- François Ledrappier (Univ. Notre Dame),
- Sheldon Newhouse (Michigan State Univ.),
- Mark Pollicott (Univ. Warwick),
- Federico Rodríguez Hertz (IMERL, Montevideo),
- Omri Sarig (Penn State Univ.),
- Jörg Schmeling (Lunds Univ.),

- Samuel Senti (Univ. Federal do Rio de Janeiro),
- Domokos Szász (Budapest Univ. Technology),
- Amie Wilkinson (Northwestern Univ.),
- Michiko Yuri (Hokkaido Univ.).

<http://www.math.ist.utl.pt/camgsd/pesin/>

XVIth Oporto Meeting on Geometry, Topology and Physics

Faro, Portugal, July 5–8, 2007

Main speakers:

- Sergei Gukov (California Institute of Technology),
- Peter Ozsváth (Columbia Univ.),
- Jacob Rasmussen (Princeton Univ.),
- Paul Turner (Heriot-Watt Univ.).

<http://www.ualg.pt/fct/omgtp/>

International Conference on Difference Equations and Applications

Lisbon, Portugal, July 23–27, 2007

Main speakers:

- Lluís Alsedà (Univ. Autònoma de Barcelona),
- Viviane Baladi (Centre National de la Recherche Scientifique),
- Francisco Balibrea (Univ. Murcia),
- Sui Sun Cheng (Tsing Hua Univ.),
- Jim Cushing (Univ. Arizona),
- Robert Devaney (Boston Univ.),
- Saber Elaydi (Trinity Univ.),
- Peter Kloeden (Macquarie Univ.),
- Gerry Ladas (Univ. Rhode Island),
- John Mallet-Paret (Brown Univ.),
- Jean Mawhin (Univ. Catholique de Louvain),
- Michal Misiurewicz (Indiana Univ.-Purdue Univ. Indianapolis),
- Kazuo Nishimura (Kyoto Univ.),
- Roger Nussbaum (State Univ. New Jersey),

- Alberto Pinto (Univ. Porto),
- Marko Robnik (Univ. Ljubljana),
- George Sell (Univ. Minnesota),
- Alexander Sharkovsky (National Academy of Sciences of Ukraine),
- Jaroslav Smital (Silesian Univ. Opava),
- Hal Smith (Arizona State Univ.),
- Lubomír Snoha (Matej Bel Univ.),
- André Vanderbauwhede (Univ. Gent).

<http://www.math.ist.utl.pt/icdea2007/>

XVI International Fall Workshop on Geometry and Physics

Instituto Superior Técnico, Portugal, September 5–8, 2007

Minicourses:

- Fernando Barbero (Consejo Superior de Investigaciones Científicas),
- Ana Cannas da Silva (Instituto Superior Técnico).

Invited speakers:

- Dmitri Alekseevsky (Univ. Edinburgh),
- José A. de Azcárraga (Univ. Valencia),
- Raquel Caseiro (Univ. Coimbra),
- Velimir Jurdjevic (Univ. Toronto),
- Klaas Landsman (Radboud Univ.),
- Jerzy Lewandowski (Warsaw Univ.),
- José Merodio (Univ. Politécnica de Madrid),
- Vicente Muñoz (Consejo Superior de Investigaciones Científicas),
- Tadashi Tokieda (Univ. Cambridge),
- Eduardo Villaseñor (Univ. Carlos III de Madrid).

<http://ifwgp2007.ist.utl.pt/>

Primeiro Encontro IST-IME

Univ. São Paulo, Brazil, September 10–15, 2007

<http://www.ime.usp.br/~istime/>

Mechanics and Lie Algebroids Day

Instituto Superior Técnico, Portugal, September 11, 2007

Speakers:

- David Iglesias Ponte (Consejo Superior de Investigaciones Científicas),
- Juan Carlos Marrero (Univ. La Laguna),
- Eduardo Martinez (Univ. Zaragoza),
- Eva Miranda (Univ. Autònoma de Barcelona),
- Edith Padrón (Univ. La Laguna),
- Miguel Rodríguez-Olmos (Ecole Polytechnique Fédérale de Lausanne),
- Patrícia Santos (Univ. Coimbra).

<http://www.math.ist.utl.pt/~rfern/AlgDay/>

Tarde SPM/CIM em Topologia Algébrica

Coimbra, Portugal, November 24, 2007

Speakers and panel moderators:

- Teresa Monteiro Fernandes (Univ. Lisboa),
- Peter Gothen (Univ. Porto),
- G. Granja (Instituto Superior Técnico),
- M. Mackaay (Univ. Algarve),
- Lucile Vandembroucq (Univ. Minho).

<http://www.spm.pt/static.php?orgId=397>

4 Postdoctoral program

The Center started a postdoctoral program in the academic year 1998/99. Positions are for one year, with the possibility of extension for a second year upon mutual agreement. Applicants must have earned a Ph.D. in mathematics preferably within a 2-year period before the opening date of the position. To be selected an applicant must show very strong research promise in one of the areas in which the members of the Center are currently active. There are no teaching duties associated with these positions. They are announced internationally including in the Notices and in the Data Base of the American

Mathematical Society. In addition, the Center hosts postdoctoral fellows supported directly by the FCT or by other research projects.

The following fellows have stayed in the Center during the whole or part of 2007:

- J. Agapito, PhD in Mathematics, Univ. California, Santa Cruz, USA, 2004. Research areas: symplectic geometry, discrete mathematics. Supported by an FCT postdoctoral grant (Jan. 2005–present).
- A. Biryuk, PhD in Mathematics, Heriot-Watt Univ., Edinburgh, 2002. Research areas: nonlinear partial differential equations, stochastic partial differential equations, differential geometry, harmonic analysis, numerical methods. Supported by the CAMGSD plurianual funding (Sep. 1, 2006–Aug. 31, 2007).
- R. Bos, PhD in Mathematics, Radboud Univ., Nijmegen, Holland, 2007. Research areas: representations of groupoids, geometric quantization, K -theory. Supported by the CAMGSD plurianual funding (Sep. 1, 2007–Aug. 31, 2008).
- J.O. Brahic, PhD in Mathematics, Univ. Montpellier II, France, 2004. Research areas: Poisson geometry, Lie groupoids and algebroids, representation theory. Supported by an FCT postdoctoral grant (Jan. 2006–present).
- R. Czaja, PhD in Mathematics, Univ. Silesia, Poland, 2004. Research areas: semilinear abstract parabolic equations. Supported by the CAMGSD plurianual funding (Sep. 1, 2005–Aug. 31, 2007).
- R. Dawe Martins, PhD in Mathematical Physics, Nottingham Univ., 2006. Research areas: Noncommutative geometry, spectral triples, standard model of particle physics, K -theory. Supported by an FCT postdoctoral grant (Oct. 2006–present).
- O. Dragulette, PhD in Mathematics, Ecole Polytechnique Fédérale de Lausanne, 2007. Research areas: Contact geometry, symplectic geometry. Supported by an FCT research grant (Nov. 2007–Oct. 2008).
- J. Faria Martins, PhD in Mathematics, Nottingham Univ., UK, 2004. Research areas: quantum topology, quantum groups, knot theory, applications of categorical groups to low dimensional topology. Supported by an FCT postdoctoral grant (Jan. 2005–present).
- J.M. Gomes, Doutoramento em Matemática, Faculdade de Ciências, Univ. Lisboa, Portugal, 2005. Research areas: partial differential equations, variational methods. Supported by an FCT postdoctoral grant (Dec. 2006–Nov. 2007).

- S. Hollander, PhD in Mathematics, Massachusetts Institute of Technology, 2001. Research areas: algebraic topology and algebraic geometry. Supported by the CAMGSD plurianual funding (Nov. 1, 2006–Oct. 31, 2008).
- G. Iommi, PhD in Mathematics, Univ. Warwick, UK, 2004. Research areas: dynamical systems. Supported by an FCT postdoctoral grant (Jan. 2006–Jul. 2007).
- S.S. Kim, PhD in Mathematics, Stanford Univ., USA, 2001. Research areas: symplectic and contact geometry. Supported by an FCT postdoctoral grant (Jul. 2005–present).
- S. Lawton, PhD in Mathematics, Univ. Maryland, USA, 2006. Research areas: algebraic geometry, invariant theory, moduli theory. Supported by an FCT postdoctoral grant (Aug. 2007–present).
- H. Li, PhD in Mathematics, Univ. Illinois, Urbana-Champaign, USA, 2003. Research area: symplectic geometry. Supported by an FCT postdoctoral grant (May 2006–Feb. 2007).
- N. Luzia, Doutorado em Matemática, Instituto Nacional de Matemática Pura e Aplicada, Brazil, 2004. Research areas: dynamical systems. Supported by an FCT postdoctoral grant (May 2005–present).
- A. Mandini, PhD in Mathematics, Univ. Bologna, Italy, 2007. Research areas: symplectic geometry. Supported by the CAMGSD plurianual funding (Sep. 1, 2007–Aug. 31, 2008).
- D. Matsnev, PhD in Mathematics, Penn State Univ., 2005. Research areas: operator algebra K -theory, noncommutative geometry, coarse geometry, Baum–Connes conjecture. Supported by the CAMGSD plurianual funding (Sep. 1, 2006–Aug. 31, 2008).
- E. Oliveira, Doutorado em Matemática, Univ. Federal do Rio Grande do Sul, Brazil, 2007. Research areas: dynamical systems, Aubry–Mather theory. Supported by an FCT postdoctoral grant (Nov. 2007–Feb. 2008).
- M. Panthee, Doutorado em Matemática, Instituto Nacional de Matemática Pura e Aplicada, Brazil, 2004. Research areas: partial differential equations, harmonic analysis. Supported by the CAMGSD plurianual funding (Dec. 15, 2004–Jan. 14, 2006) and an FCT postdoctoral grant (Jan. 15, 2006–Dec. 2008).
- S. Papadakis, PhD in Mathematics, Warwick Univ., UK, 2002. Research areas: birational geometry, commutative algebra, computer al-

gebra methods in algebraic geometry, algebraic surfaces, unprojection. Supported by an FCT postdoctoral grant (Jul. 2006–present).

- R. Popescu, Doctorat de Mathématiques, Univ. Claude Bernard, Lyon 1, France, 2000. Research areas: C*-algebras, bivariant K-theory, groupoids, foliations, quantales. Supported by an FCT postdoctoral grant (Apr. 2005–present).
- N. Sousa, PhD in Physics, Katholieke Univ. Nijmegen (now Radbaud Univ.), The Netherlands, 2003. Research areas: string theory, conformal field theory, topological string theory, geometric quantization, matrix models. Supported by an FCT postdoctoral grant (Mar. 2006–present).
- C. Valls, Doctor in Matemáticas, Univ. Barcelona, Spain, 1999. Research areas: dynamical systems. Supported by two FCT postdoctoral grants (Oct. 2003–Jan. 2008).
- B. Van Steirteghem, PhD in Mathematics, Columbia Univ., USA, 2004. Research areas: algebraic groups, symplectic geometry. Supported by the CAMGSD plurianual funding (Nov. 1, 2004–Jan. 31, 2006) and an FCT postdoctoral grant (Feb. 1, 2006–present).

5 Publications in 2007

Publications which appeared in 2007

Books

L. Barreira and Ya. Pesin, *Nonuniform Hyperbolicity: Dynamics of Systems With Nonzero Lyapunov Exponents*, Encyclopedia of Mathematics and Its Applications, vol. 115, Cambridge University Press, 2007.

A. Cannas da Silva, *Introduction to Symplectic and Hamiltonian Geometry* (Revised printing), Publicações Matemáticas do IMPA, Rio de Janeiro, 2007.

J. Mourão, J. Nunes, R. Picken, and J.-C. Zambrini (eds.), *Prospects in Mathematical Physics*, Papers from the Young Researchers Symposium of the 14th International Congress on Mathematical Physics, Lisbon, July 28–August 2, 2003, Contemp. Math., 437, Amer. Math. Soc., Providence, RI, 2007.

Articles in international journals with referees

J. Agapito and L. Godinho, New polytope decompositions and Euler–Maclaurin formulas for simple integral polytopes, *Adv. Math.* **214** (2007), no. 1, 379–416.

- S. Anjos and F. Lalonde, The topology of the space of symplectic balls in $S^2 \times S^2$, *C. R. Math. Acad. Sci. Paris, Ser. I* **345** (2007), 639–642.
- M. Baía and I. Fonseca, The limit behavior of a family of variational multi-scale problems, *Indiana Univ. Math. J.* **56** (2007), no. 1, 1–50.
- L. Barreira and L. Radu, Multifractal analysis of nonconformal repellers: a model case, *Dyn. Syst.* **22** (2007), 147–168.
- L. Barreira and C. Valls, Conjugacies for linear and nonlinear perturbations of nonuniform behavior, *J. Funct. Anal.* **253** (2007), 324–358.
- L. Barreira and C. Valls, Hölder Grobman–Hartman linearization, *Discrete Contin. Dyn. Syst.* **18** (2007), no. 1, 187–197.
- L. Barreira and C. Valls, Nonuniform exponential dichotomies and Lyapunov regularity, *J. Dynam. Differential Equations* **19** (2007), no. 1, 215–241.
- L. Barreira and C. Valls, Reversibility and equivariance in center manifolds of nonautonomous dynamics, *Discrete Contin. Dyn. Syst.* **18** (2007), no. 4, 677–699.
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- L. Barreira and C. Valls, Stability theory and Lyapunov regularity, *J. Differential Equations* **232** (2007), no. 2, 675–701.
- L. Barreira and C. Wolf, Dimension and ergodic decompositions for hyperbolic flows, *Discrete Contin. Dyn. Syst.* **17** (2007), no. 1, 201–212.
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- J. Buescu and A. Paixão, Eigenvalue distribution of positive definite kernels on unbounded domains, *Integral Equations Operator Theory* **57** (2007), 19–41.
- J. Buescu and A. Paixão, Eigenvalue distribution of Mercer-like kernels, *Math. Nachr.* **280** (2007), no. 9–10, 984–995.
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- M. Câmara, A. Ferreira dos Santos, and P. Ferreira dos Santos, Lax equation, factorization and Riemann–Hilbert problems, *Port. Math. (N.S.)* **64** (2007), no. 4, 509–533.
- N. Caporaso, L. Griguolo, M. Mariño, and S. Pasquetti, Phase transitions, double-scaling limit, and topological strings, *Phys. Rev. D* **75** (2007), no. 4, 046004, 24 pp.
- C. Ciliberto, M. Mendes Lopes, and R. Pardini, Surfaces with $K^2 < 3\chi$ and finite fundamental group, *Math. Res. Lett.* **14** (2007), no. 6, 1081–1098.
- L. Cornalba, M. Costa, J. Penedones, and R. Schiappa, Eikonal approximation in AdS/CFT: conformal partial waves and finite N four-point functions, *Nuclear Phys. B* **767** (2007), no. 3, 327–351.
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- S. Hollander, Descent for quasi-coherent sheaves on stacks, *Algebr. Geom. Topol.* **7** (2007), 411–437.
- S. Lawton, Generators, relations and symmetries in pairs of 3×3 unimodular matrices, *J. Algebra* **313** (2007), 782–801.
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- J. Llibre and C. Valls, On the integrability of the Einstein–Yang–Mills equations, *J. Math. Anal. Appl.* **336** (2007), 1203–1230.
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- M. Mackaay and P. Turner, Bar-Natan’s Khovanov homology for coloured links, *Pacific J. Math.* **229** (2007), no. 2, 429–446.
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- J. Matias, Differential inclusions in $SBV_0(\Omega)$ and applications to the calculus of variations, *J. Convex Anal.* **14** (2007), no. 3, 465–477.

- M. Mendes Lopes and R. Pardini, On the algebraic fundamental group of surfaces with $k^2 \leq 3\chi$, *J. Differential Geom.* **77** (2007), 189–199.
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- J. Natário, Quasi-Maxwell interpretation of the spin-curvature coupling, *Gen. Relativity Gravitation* **39** (2007), no. 9, 1477–1487.
- A. Neves, Singularities of Lagrangian mean curvature flow: zero-Maslov class case, *Invent. Math.* (2007), no. 168, 449–484.
- B. Oliver and J. Ventura, Extensions of linking systems with p -group kernel, *Math. Ann.* **338** (2007), no. 4, 983–1043.
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- P. Pinto, Simple current modular invariants from braided subfactors, *Chaos Solitons Fractals* **33** (2007), 135–142.
- P. Pinto, Twisted quantum \mathbb{Z}_n modular data and braided subfactors, *J. Phys. A* **40** (2007), no. 31, 9387–9397.
- P. Resende, Étale groupoids and their quantales, *Adv. Math.* **208** (2007), no. 1, 147–209.
- C. Rito, On surfaces with $p_g = q = 1$ and non-ruled bicanonical involution, *Ann. Sc. Norm. Super. Pisa Cl. Sci. (5)* **6** (2007), no. 1, 81–102.
- C. Rocha, Realization of period maps of planar Hamiltonian systems, *J. Dynam. Differential Equations* **19** (2007), no. 3, 571–591.

J. Santos, Dirac operators coupled to instantons on positive definite four-manifolds, *Math. Z.* **257** (2007), no. 4, 845–870.

R. Schiappa, L. Cornalba, M. Costa, and J. Penedones, Eikonal approximation in AdS/CFT: conformal partial waves and finite N four-point functions, *Nuclear Phys. B* (2007), 327–351.

R. Schiappa, L. Cornalba, M. Costa, and J. Penedones, Eikonal approximation in AdS/CFT: from shock waves to four-point functions, *J. High Energy Phys.* (2007).

J. Silva, An accuracy improvement in Egorov’s theorem, *Publ. Mat.* **51** (2007), no. 1, 77–120.

Communications in proceedings with referees

J. Alves and J. Fachada, On the Ruelle zeta function of an expanding interval map, S. Elaydi, J. Cushing, R. Lasser, A. Ruffing, V. Papageorgiou, and W. Van Assche (eds.), *Proc. International Conference Difference Equations, Special Functions and Orthogonal Polynomials (Munich, Germany, 25–30 July 2005)*, World Scientific, 2007.

F. da Costa, J. Pinto, and R. Sasportes, Convergence to self-similarity in an addition model with power-like time-dependent input of monomers, V. Cutello, G. Fotia, and L. Puccio (eds.), *Applied and Industrial Mathematics in Italy II*, Selected Contributions from the 8th SIMAI Conference, Series on Advances in Mathematics for Applied Sciences, vol. 75, World Scientific, Singapore, 2007, pp. 303–314.

M. Mariño, String theory and knot invariants, *Prospects in Mathematical Physics*, 199–207, Contemp. Math., 437, Amer. Math. Soc., Providence, RI, 2007.

J. Teixeira, Local-in-time existence of strong solutions of the n -dimensional Burgers equation via discretizations, I. van den Berg and V. Neves (eds.), *The Strength of Nonstandard Analysis*, Springer, 2007.

Accepted publications (submitted or accepted in 2007)

Books

L. Barreira and C. Valls, *Stability of Nonautonomous Differential Equations*, Lecture Notes in Mathematics 1926, Springer, 2008.

Chapters in books

S. Lawton and E. Peterson, Spin networks and $SL(2, \mathbb{C})$ -character varieties, To appear in *Handbook of Teichmüller Theory, Volume II*, European Math. Soc.

Articles in international journals with referees

M. Abreu, A personal tour through symplectic topology and geometry, To appear in *São Paulo J. Math. Sci.*

M. Abreu, E. Dryden, P. Freitas, and L. Godinho, Hearing the weights of weighted projective planes, To appear in *Ann. Global Anal. Geom.*

J. Alves, What we need to find out the periods of a periodic difference equation, To appear in *J. Difference Equ. Appl.*

J. Babadjian, M. Baía, and P. Santos, Characterization of two-scale Gradient Young measures and application to homogenization, *Appl. Math. Optim.* **57** (2008), no. 1, 69–97.

L. Barreira and V. Saraiva, Multifractal nonrigidity of topological Markov chains, To appear in *J. Statist. Phys.*

L. Barreira, C. Silva, and C. Valls, Integral stable manifolds in Banach spaces, To appear in *J. London Math. Soc.*

L. Barreira, C. Silva, and C. Valls, Regularity of invariant manifolds for nonuniformly hyperbolic dynamics, To appear in *J. Dynam. Differential Equations*.

L. Barreira and C. Valls, Asymptotic behavior of distribution of frequencies of digits, To appear in *Math. Proc. Cambridge Philos. Soc.*

L. Barreira and C. Valls, Characterization of stable manifolds for nonuniform exponential dichotomies, To appear in *Discrete Contin. Dyn. Systems*.

L. Barreira and C. Valls, Conjugacies between linear and nonlinear nonuniform contractions, To appear in *Ergodic Theory Dynam. Systems*.

L. Barreira and C. Valls, Delay equations and nonuniform exponential stability, To appear in *Discrete Contin. Dyn. Syst. S*.

L. Barreira and C. Valls, Growth rates and nonuniform hyperbolicity, To appear in *Discrete Contin. Dyn. Syst.*

- L. Barreira and C. Valls, Hausdorff dimension and quadratic relations between frequencies of digits, To appear in São Paulo J. Math. Sci.
- L. Barreira and C. Valls, Stability in nonautonomous dynamics: a survey of recent results, To appear in São Paulo J. Math. Sci.
- L. Barreira and C. Valls, Optimal estimates along stable manifolds of nonuniformly hyperbolic dynamics, To appear in Proc. Roy. Soc. Edinburgh Sect. A.
- A. Calabri, M. Mendes Lopes, and R. Pardini, Involutions on numerical Campedelli surfaces, To appear in Tohoku Math. J.
- F. Camilli, I. Dolcetta, and D. Gomes, Error estimates for the approximation of the effective Hamiltonian, To appear in Appl. Math. Optim.
- J. Cholewa, R. Czaja, and G. Mola, Remarks on the fractal dimension of bi-space global and exponential attractors, To appear in Bollettino della Unione Matematica Italiana, Ser. B.
- R. Cordovil, B. Junior, and M. Lemos, Removing circuits in 3-connected binary matroids, To appear in Discrete Mathematics.
- R. Cordovil, M. Lemos, and C. Sales, Dirac's theorem on simplicial matroids, To appear in Annals of Combinatorics.
- C. Correia Ramos, N. Martins, P. Pinto, and J. Sousa Ramos, Cuntz–Krieger algebras representations from orbits of interval maps, *J. Math. Anal. Appl.* **341** (2008), 825–833.
- R. Czaja and C. Rocha, Transversality in scalar reaction-diffusion equations on a circle, To appear in J. Differential Equations.
- P. Damianou and R. Loja Fernandes, Integrable hierarchies and the modular class, *Ann. Inst. Fourier (Grenoble)* **58** (2008), no. 1, 107–137.
- E. D'Aniello and H. Oliveira, Bifurcations of periodic non autonomous maps of the interval, To appear in J. Difference Equ. Appl.
- E. D'Aniello and H. Oliveira, Periodic orbits for alternating systems, To appear in Real Anal. Exchange.
- J. Faria Martins, The fundamental crossed module of the complement of a knotted surface, To appear in Trans. Amer. Math. Soc.
- J. Faria Martins and A. Mikovic, Invariants of spin networks embedded in three-manifolds, To appear in Comm. Math. Phys.

- B. Fiedler and C. Rocha, Connectivity and design of planar global attractors of Sturm type. I: Orientations and Hamiltonian paths, To appear in *J. Reine Angew. Math.*
- B. Fiedler and C. Rocha, Connectivity and design of planar global attractors of Sturm type. II: Connection graphs, To appear in *J. Differential Equations.*
- D. Gomes and J. Silva, On the Wigner transform of solutions to the Schrödinger equation, To appear in *São Paulo J. Math. Sciences.*
- P. Henriques, The inverse problem of variational calculus and the problem of mixed endpoint conditions, To appear in *São Paulo J. Math. Sciences.*
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- S. Lawton, Poisson geometry of $SL(3, \mathbb{C})$ -character varieties relative to a surface with boundary, To appear in *Trans. Amer. Math. Soc.*
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- J. Llibre and C. Valls, Centers for a 6-parameter family of polynomial vector fields of arbitrary degree, To appear in *Bull. Sci. Math.*
- J. Llibre and C. Valls, Darboux integrability and algebraic invariant surfaces for the Rikitake system, To appear in *J. Math. Phys.*
- J. Llibre and C. Valls, Formal and analytic integrability of the Rossler system, To appear in *J. Bifur. Chaos Appl. Sci. Engrg.*
- J. Llibre and C. Valls, Integrability of a SIS model, To appear in *J. Math. Anal. Appl.*
- J. Llibre and C. Valls, On the limit cycles of polynomial differential systems with homogeneous nonlinearities of degree 3 via the averaging method, To appear in *Dyn. Contin. Discrete Impuls. Syst. Ser. A Math. Anal.*
- R. Loja Fernandes and I. Struchiner, Lie algebroids and classification problems in geometry, To appear in *São Paulo J. Math. Sciences.*

- M. Mackaay and P. Vaz, The foam and the matrix factorization sl_3 link homologies are equivalent, To appear in Algebraic and Geometric Topology.
- J. Matias, Necessary and sufficient conditions for existence of solutions of a divergence-type variational problem, To appear in São Paulo J. Math. Sciences.
- J. Natário, Tangent Euler top in general relativity, To appear in Comm. Math. Phys.
- J. Neves and S. Papadakis, A construction of numerical Campedelli surfaces with torsion $\mathbb{Z}/6$, To appear in Trans. Amer. Math. Soc.
- W. Oliva, M. Kobayashi, and G. Terra, Anosov flows and invariant measures in constrained mechanical systems, To appear in São Paulo J. Math. Sci.
- W. Oliva and C. Rocha, Reducible Volterra retarded equations with infinite delay, To appear in São Paulo J. Math. Sci.
- B. Oliver and J. Ventura, Extensions of linking systems with p -group kernel, To appear in Math. Ann.
- S. Papadakis, The equations of type II_1 unprojection, To appear in J. Pure Appl. Algebra.
- M. Perlmutter, M. Rodríguez-Olmos, E. Dias, The symplectic normal space of a cotangent-lifted action, To appear in Differential Geom. Appl.
- R. Popescu, Coactions of Hopf C^* -algebras and equivariant E -theory, To appear in J. Noncommut. Geom.
- P. Resende and E. Rodrigues, Sheaves as modules, To appear in Appl. Categ. Structures.
- P. Santos, A relaxation result for micromagnetics in SBH, To appear in Nonlinear Differential Equations and Applications.
- P. Santos and E. Zappale, Lower semicontinuity in SBH, To appear in Mediterranean Journal of Mathematics.
- R. Schiappa, M. Mariño, and M. Weiss, Nonperturbative effects and the large-order behavior of matrix models and topological strings, To appear in Communications in Number Theory and Physics.
- C. Valls, Bifurcation of limit cycles and integrability conditions for 6-parameter families of polynomial vector fields of arbitrary degree, To appear in Nonlinear Anal.

C. Valls, Existence of quasiperiodic solutions for the second order approximation Boussinesq system, To appear in *Nonlinear Anal.*

C. Valls, New arbitrary parameter families of centers for polynomial vector fields of arbitrary degree, To appear in *Dyn. Syst.*

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J. Alves, On periodic points of 2-periodic dynamical systems, To appear in *Proc. ICDEA 11 (Advanced Studies in Pure Math. series, Math. Soc. Japan)*.

A. Cannas da Silva, 4-manifolds with a symplectic bias, To appear in *Proc. XVI International Fall Workshop on Geometry and Physics, September 5–8, 2007, Lisbon, Portugal*.

C. Correia Ramos, N. Martins, and P. Pinto, Orbit representations and circle maps, To appear.

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R. Loja Fernandes and O. Brahic, Poisson fibrations and fibered symplectic groupoids, To appear in *Contemp. Math., Amer. Math. Soc., Providence, RI*.

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P. Berthomé, R. Cordovil, D. Forge, V. Vento, and T. Zaslavsky, An elementary chromatic reduction for gain graphs and special hyperplane arrangements, Preprint, 2007.

V. Bouchard, A. Klemm, M. Mariño, and S. Pasquetti, Remodeling the B-model, Preprint, 2007.

- V. Bouchard and M. Mariño, Hurwitz numbers, matrix models and enumerative geometry, Preprint, 2007.
- M. Câmara, A. Ferreira dos Santos, and P. Ferreira dos Santos, Matrix Riemann–Hilbert problems and factorization on Riemann surfaces, Preprint, 2007.
- F. da Costa, M. Grinfeld, N. Mottram, and J. Pinto, Uniqueness in the Freedericksz transition with weak anchoring, Preprint, July 2007.
- R. Czaja and M. Efendiev, A note on attractors with finite fractal dimension, Preprint, 2007.
- J. Faria Martins and R. Picken, On 2-dimensional holonomy, Preprint, 2007.
- B. Fiedler and C. Rocha, Connectivity and Design of Planar Global Attractors of Sturm Type. III: Small and Platonic Examples, Preprint, 2007.
- P. Girão and J. Gomes, Multibump nodal solutions for an indefinite super-linear elliptic problem, Preprint, 2007.
- P. Girão and J. Gomes, Multibump nodal solutions for an indefinite nonhomogeneous elliptic problem, Preprint, 2007.
- D. Gomes, Generalized Mather problem and selection principles for viscosity solutions and Mather measures, Preprint, 2007.
- D. Gomes and A. Lopes, Exponential decay of correlation for the Stochastic Process associated to the Entropy Penalized Method, Preprint, 2007.
- G. Granja and S. Hollander, Realizing modules over the homology of a DGA, Preprint, July 2007.
- T. Harmark, J. Natário, and R. Schiappa, Greybody factor for d-dimensional black holes, Preprint, 2007.
- S. Hollander, Diagrams indexed by Grothendieck constructions and stacks on stacks, Preprint, June 2007.
- M. Huang, A. Klemm, M. Mariño, A. Tavanfar, Black holes and large order quantum geometry, Preprint, 2007.
- L. Kauffman and P. Lopes, Graded forests and rational knots, Preprint, 2007.
- S. Lawton, Minimal affine coordinates for $SL(3, \mathbb{C})$ -character varieties of free groups, Preprint, 2007.

- R. Loja Fernandes, J. Ortega, and T. Ratiu, The momentum map in Poisson geometry, Preprint, 2007.
- R. Luís and H. Oliveira, The long term behaviour for the Marx model of economy, Preprint, 2007.
- M. Mackaay, M. Stosic, and P. Vaz, $Sl(N)$ link homology using foams and Kapustin–Li formula, Preprint, 2007.
- S. Marcelino and P. Resende, An algebraic generalization of Kripke structures, Preprint, 2007.
- R. Martins, Double Fell bundles and spectral triples, Preprint, 2007.
- D. Matsnev, The Baum–Connes conjecture and proper group actions on affine buildings, Preprint, 2007.
- D. Matsnev, The Baum–Connes conjecture for countable subgroups of $SL(2)$, Preprint, 2007.
- F. Mena, J. Natário, and P. Tod, Avoiding closed timelike curves with a collapsing rotating null dust shell, Preprint, 2007.
- F. Mena, J. Natário, and P. Tod, Gravitational collapse to toroidal and higher genus asymptotically AdS black holes, Preprint, 2007.
- M. Mariño, R. Schiappa, and M. Weiss, Nonperturbative effects and the large-order behavior of matrix models and topological strings, Preprint, 2007.
- A. Neves and G. Tian, Translating solutions to Lagrangian mean curvature flow , Preprint, 2007.
- A. Neves, Insufficient convergence of inverse mean curvature flow on asymptotically hyperbolic manifolds, Preprint, 2007.
- A. Neves and G. Tian, Existence and Uniqueness of constant mean curvature foliation of asymptotically hyperbolic 3-manifolds II, Preprint, 2007.
- B. Oliver and J. Ventura, Saturated fusions systems over 2-groups, Preprint, 2007.
- P. Pinto, Twisted quantum \mathbb{Z}_n modular data and braided subfactors, Preprint, 2007.
- M. Rodríguez-Olmos and E. Dias, Nonlinear stability of Riemann ellipsoids with symmetric configurations, Preprint, 2007.
- J. Santos, A stratification of the moduli of holomorphic vector bundles on the blowup of a surface, Preprint, 2007.
- J. Santos, Holomorphic bundles on the blown-up plane and the bar construction, Preprint, 2007.

6 Partnership and outreach

In October 2004 the Center submitted to the Minister of Science, Innovation and Higher Education a request for the Statute of Associate Laboratory, with a strategic project entitled “Internationalization of the Research and Promotion of Mathematics in Portugal”. Besides pursuing the strategy of further development and internationalization of the research activities, in particular through the Postdoctoral Program and a Program for career development and employment of new researchers, the Center signed partnership protocols with the Institute for Systems and Robotics - Lisbon (Instituto de Sistemas e Robótica-Lisbon) and with the Institute of Telecommunications (IT) regarding interdisciplinary research cooperation, and also signed partnership protocols with 44 secondary and primary schools, which together enroll more than 38000 students, aiming at the promotion of Mathematics at these education levels through a set of activities oriented towards students and teachers.

While the evaluation of the request for the Statute of Associate Laboratory is still in progress, the Center has nevertheless started to develop various activities in collaboration with the secondary schools and it has also pursued its past collaboration with the “Ciência Viva” Program and with the “Programa Gulbenkian Novos Talentos em Matemática”. Some of these activities are listed below.

Lecture in secondary school. “Qual a forma do Universo” (João Pimentel Nunes), Colégio do Vale, February, 2007.

Science exhibition. Participation in “Ciência 2007 — Encontro Público com a Ciência”, Lisbon, April 14, 2007. http://www.pavconhecimento.pt/-destaques/index.asp?acao=shownot&id_noticia=247.

Summer school for undergraduates. “Escola Diagonal 2007”, Lisbon, September 3–7, 2007, <http://www.math.ist.utl.pt/talentos/edicao7.html#escola>.

Mathematics conference for undergraduates. “Encontro Nacional do Programa Gulbenkian Novos Talentos em Matemática”, Lisbon, September 7–8, 2007, <http://www.math.ist.utl.pt/talentos/edicao7.html#encontro>.

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Department of Mathematics
Instituto Superior Técnico
Portugal

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1 Introduction

1.1 Main goals and scientific activities

The main purpose of CEMAT (Centre for Mathematics and its Applications) is to engage in high quality research and graduate studies in applied mathematics, focusing on applications of statistics, stochastic processes, and numerical analysis, while promoting the scientific enrichment of its members and collaborators.

One of the main goals of CEMAT is to promote the interplay between Mathematics and its Applications as a way to foster the dissemination of results in applied mathematics derived by the research center members, and, at the same time, to find continuous motivation from the applications to formulate and answer stimulating mathematical questions. In 2007, CEMAT carried out integrative/multidisciplinary activities in the following areas:

- Modelling and Scientific Computing in Medicine
- Numerical Methods in Engineering
- Modelling and Simulation of Geophysical Flows
- Statistics and Biology
- Statistics in Medicine
- Stochastic Modelling in Telecommunications

These activities, which are reported in Section 3, were supported by several international and national projects, listed in Section 4.

CEMAT is strongly committed to the dissemination of its scientific achievements to the mathematics community and, at large, to the researchers and professionals that apply contemporary tools from mathematics in their work. The publication record of CEMAT members in 2007 is reported in sections 5 and 6. The dissemination activity is also promoted through: the regular participation of members of CEMAT in international workshops and conferences, complemented by the presentation of research lectures, as reported in Section 7; the organization of: seminars, as presented in Section 8; and the organizations of the scientific events, as shown in Section 9. The previous goal is complemented by the objective of disseminating the interest for mathematics, and science in general, to the society at large and, in particular, to private or public institutions and schools. The first are usually reached by CEMAT through internships of undergraduate and M.Sc. students under the supervision of CEMAT members.

High international quality, postgraduate, postdoctoral and visitors programs are envisaged at CEMAT. In 2007, the postgraduate program was based on the following two MSc degrees

- MSc in Mathematics of IST
- MSc in Statistics of IST

and five PhD degrees with strong or leading involvement of CEMAT members:

- PhD in Mathematics of IST
- PhD in Statistics and Stochastic Processes of IST
- Lisbon-Carnegie Mellon University PhD in Mathematics
- UT Austin-Lisbon PhD in Computational Engineering
- UT Austin-Lisbon PhD in Mathematics

The last three PhD degrees are relative to collaborations with top international universities will serve to enhance the capability of CEMAT to be involved in successful international PhD programs. During the year, 7 PhD and 5 MSc theses were concluded or supervised by CEMAT members, as listed in Section 10.

In addition, CEMAT runs an attractive postdoctoral program in Computational and Stochastic Mathematics, a strong visitors program, and active seminar series. The visitors program is vital for the high quality of the doctoral and postdoctoral programs of CEMAT and, moreover, visitors collaborate in the vast majority of the seminars organized by CEMAT, reported in Section 7. During 2007, the following fellows hold postgraduate positions at CEMAT: Abdel Artoli, Alberto Gambaruto, Alexandra Moura, João Costa e Silva, and Sellountos Euripides.

1.2 List of members

At the end of 2007, CEMAT had a total of 47 members, of which 28 with a PhD degree, and several collaborators. The full list of CEMAT members is given below.

PhD members:

- Abdel Artoli (IST)
- Adélia Sequeira (IST)
- Alberto Gambaruto (IST)
- Alexandra Moura (IST)
- Ana Leonor Silvestre (IST)
- Ana Pires (IST)
- António Pacheco (IST)
- Carla Pereira (UPorto)
- Carlos Alves (IST)
- Cláudia Nunes (IST)
- Conceição Amado (IST)
- Fátima Ferreira (UTAD)
- Helena Ribeiro (IPLeiria)
- Isabel Rodrigues (IST)
- João Amaral (IST)
- João Branco (IST)
- João Costa e Silva (IST)
- Juha Videman (IST)
- Luís Borges (ISEL)
- Manuel Cabral Morais (IST)
- Nelson Antunes (UAlgarve)
- Nuno Diniz dos Santos (GLAIZER Group)

- Pedro Lima (IST)
- Pedro Serranho (IPLeiria)
- Rafael Santos (UAlgarve)
- Rosário Oliveira (IST)
- Sellountos Euripides (IST)
- Teresa Diogo (IST)

Post-graduate students:

- Ana Freitas (IST)
- Bruno Pereira (ISEL)
- Celestino Coelho (UAlgarve)
- Cláudia Pascoal (IST)
- Elena Almaraz-Luengo (UComplutense)
- Elisabete Fernandes (IST)
- Euclides Luís (IST)
- Filipa Encarnação (IST)
- Filomena Teodoro (IPSetúbal)
- João Janela (ISEG)
- Luísa Morgado (UTAD)
- Magda Rebelo (FCT/UNL)
- M. Filomena Teodoro (FCT/UNL)
- Nuno Martins (FCT/UNL)
- Patrícia Ferreira (IST)
- Pedro Antunes (IPLeiria)
- Sílvia Nobre (IST)
- Svilen Valtchev (IPLeiria)
- Vanda Lourenço (FCT/UNL)

1.3 Management structure

CEMAT has the following ruling bodies:

- Executive Board
- Scientific Council Board
- Scientific Council

The Center is managed by the Executive Board, constituted by:

- António Pacheco (President)
- Adélia Sequeira (Vice-President)
- Ana Pires

The Scientific Council is constituted by the PhD members of CEMAT and: elects the President; ratifies the Executive Board; approves changes to the statutes and to the creation and dissolution of research groups. The Scientific Council Board is constituted by the members of the Executive Board and the coordinators of research groups. It approves the annual activity reports and collaborates with the Coordinator in the definition of research policies.

In addition, CEMAT has an International Advisory Committee constituted by:

- Alfio Quarteroni (EPFL, Switzerland, and Politecnico di Milano, Italy)
- Guy Latouche (Université Libre de Bruxelles, Belgium)
- J. George Shanthikumar (UC Berkeley, USA)
- Peter Rousseeuw (University of Antwerp, Belgium)

2 Main research achievements

In 2007, the research carried out at CEMAT was structured in research groups on:

- Applications in Engineering and Biosystems
- Applied and Numerical Analysis
- Statistics and Stochastic Processes

The research carried out at CEMAT lead to the publication in 2007 of:

- 8 Books or Special Journal Issues (authored or edited)
- 7 Chapters/articles in books with refereeing
- 31 Articles in international journals
- 17 Articles/communication in proceedings of conferences

as reported in Section 5. In addition, 34 research works were accepted for publication in 2007 but not published during the year; these are listed in Section 6.

2.1 Applications in Engineering and Biosystems Group

The research carried out by the Applications in Engineering and Biosystems Group during 2007 lead to:

- In applications to haemodynamics and haemorheology the major contributions include: study of blood rheology and development of accurate numerical techniques for non-Newtonian blood flow models; analysis and simulation of multiscale 3D FSI and 3D-1D blood flow models in compliant vessels, including the carotid bifurcation, the circle of Willis and heart valves; numerical results for the validation of a phenomenological model of blood coagulation; study of the of leukocytes migration in venules, using experimental data and numerical simulations with a lattice Boltzmann method.
- Clustering of Internet users based on their traffic generated series, in telecommunications.
- Innovative use of generalized linear models and several multivariate techniques to ecotoxicological evaluation, use of latent variable models to evaluate sensitivities of diagnostic tests in epidemiology; and mapping of quantitative trait loci based on the skew-normal distribution in genetics.

2.2 Applied and Numerical Analysis Group

The research carried out by the Applied and Numerical Analysis Group during 2007 lead to:

- Accurate and stable numerical techniques based on finite elements, finite volumes and hybrid methods to study the flow behaviour of inelastic and viscoelastic fluids in 2D and 3D bounded domains, including curved pipes.
- High accuracy numerical solutions for generalized Newtonian flows in ducts and pipes.
- Construction of nonlinear artificial boundary conditions for viscous fluids.
- Analysis of the asymptotic behaviour of steady solutions of the exterior Navier-Stokes equations taking into account the rotation of the obstacle.
- Derivation of asymptotic expansions of solutions near singularities for some nonlinear BVP and FBP and of effective computational methods for such problems.
- Investigation of the properties of solutions of a class of linear VIE with weakly singular kernels and new numerical methods to compute accurate their solutions.
- Analysis of the convergence and superconvergence properties of piecewise polynomial collocation methods.
- Development of hybrid methods for sound-hard and sound-soft obstacles.
- Application of geometric tools to derive high order numerical methods (without area integrals) for stochastic partial differential equations.

2.3 Statistics and Stochastic Processes Group

The research carried out by the Statistics and Stochastic Processes Group during 2007 lead to:

- New robust statistical methods in multivariate analysis for: common principal components, principal component analysis, discriminant analysis, and multiple linear regression with autoregressive correlated errors.
- Sufficient conditions for the level crossing ordering of general semi-Markov processes and Markov chains, and an innovative analysis of queues with stochastic customer acceptance policy using stochastic ordering techniques to derive bounds for their performance measures.

- New results on meta-stability behaviour in stochastic networks, and efficient algorithms to compute consecutive customer losses and moments of the duration of busy periods in regular and oscillating queueing systems.

The research lectures, publications and theses that resulted from the research carried on during 2007 are reported in sections 5-7 and 10. In 2007, the following awards were received by Carlos Alves and Pedro Serranho:

- UTL/Santander Totta Scientific Prizes 2007. Honorable Mention in Pure Mathematics or Applied Mathematics. Recipient: Carlos Alves.
- Gulbenkian Research Stimulus Award 2007 (Prémio Gulbenkian de Estímulo à Investigação 2007), in the area of Differential Equations. Recipient: Pedro Serranho.

3 Integrative/multidisciplinary activities

In 2007, CEMAT carried out integrative/multidisciplinary activities in the following areas:

1. Modelling and Scientific Computing in Medicine
2. Numerical Methods in Engineering
3. Modelling and Simulation of Geophysical Flows
4. Statistics and Biology
5. Statistics in Medicine
6. Stochastic Modelling in Telecommunications

These activities were supported by several international and national projects, reported in Section 4, and led to joint supervisions, publications, and communications. We next report on the activities in each of the listed areas.

1. CEMAT collaborated with bioengineers and medical researchers:
 - (a) In new models of blood rheology - Department of Mechanical Engineering and McGowan Institute for Regenerative Medicine, U Pittsburgh, USA (A.M. Robertson, M. Kameneva).
 - (b) In numerical simulations of blood flow models, following up activities done in the framework of the EU-Research Training Network HaeMOdel – CMS-C-EPFL, Switzerland and MOX, Poli Milano, Italy (groups of A. Quarteroni), Imperial College, UK (J. Peiró, S. Sherwin).
 - (c) In experimental validation studies of microcirculation rheologic parameters – Vascular Biopathology Unit - IMM/FML (C. Saldanha).
2. CEMAT collaborated with civil and mechanical engineers from:
 - (a) ICIST (Instituto de Engenharia de Estruturas, Território e Construção, IST) - (V. Leitão, C. Tiago) and CICC (Centro de Investigação em Ciências da Construção, U Coimbra) - (A. Tadeu, J. António) on numerical methods for crack analysis and elastic wave propagation in stratified media.
 - (b) COPPE/UFRJ (Universidade Federal do Rio de Janeiro) - Mechanical Engineering Department (group of Helcio Orlando) and Nuclear Engineering Department (N. Roberty), and IME/RJ (Instituto Militar de Engenharia do Rio de Janeiro) – (M. Colaço), on numerical methods for the study of inverse problems in engineering.
3. CEMAT collaborated with the following Marine research units:
 - (a) Marine and Environmental Technology Center (MARETEC - IST) - (Aires dos Santos) on baroclinic and barotropic instabilities in geophysical flows.

- (b) Centre for Macaronesian Studies (CEM - U Madeira) - (Rui Caldeira) on computational simulation of deep water island wakes.
 - (c) NATO Undersea Research Center (La Spezia, Italy) - (João Teixeira) on numerical cloud modeling.
4. CEMAT collaborated with the following Biology research units:
- (a) IBET (Instituto de Biologia Experimental e Tecnológica) on the analysis of genetic/genomic data (C. Marques and M. Rocheta);
 - (b) INETI (Instituto Nacional de Engenharia, Tecnologia e Inovação) – Department of Biotechnology, on the development of new methods for the analysis of ecotoxicology data (A. Picado, J. Catarino, E. Mendonça).
 - (c) IGC (Instituto Gulbenkian de Ciência), on models for genetic interaction in complex binary traits (C.P. Gonçalves).
5. CEMAT collaborated with the following health research units:
- (a) Epidemiology and Biostatistics Unit of IHMT (Institute de Higiene e Medicina Tropical, UNL), on the study of Leishmanioses (L. Gonçalves).
 - (b) Pathological Anatomy Unit (Instituto Português de Oncologia, Lisboa), on survival analysis of several cancer diseases (group of A.E. Pinto).
6. CEMAT collaborated with telecommunications engineers from:
- (a) Around 60 European telecommunications research units, mainly in the organization of international scientific meetings, within the framework of the EU Network of Excellence Euro-FGI; and
 - (b) IT (InstituteTelecommunications) in the modelling and analysis of IP traffic, pursued in an FCT project (A. Nogueira, P. Salvador, R. Valadas).

4 Involvement in research projects

During 2007, CEMAT members were involved in the following R&D projects:

- Statistical Analysis of Complex Data with Robust and Related Statistical Methods, European Science Foundation (ESF) network (2004-2007). Coordinator: Christophe Croux, Katholieke Universiteit Leuven, Belgium. CEMAT Participants: M. R. Oliveira.
- Blood Flow Modelling in the Vascular System, Bilateral Project Portugal/Tunisia, with H. Chaker (LAMSIN/ENIT) [2004-2007]. A. Sequeira: PI. CEMAT Participants: J. Janela.
- Analysis of Mathematical Models for the Motion of Rigid Bodies in Incompressible Fluids, POCTI/MAT/61792/2004, [2005-2007]. Coordinator: A. L. Silvestre.
- Inverse Problems and Meshless Methods in PDEs, Project POCTI/MAT/60863/2004, [2005-2007]. Coordinator: C. Alves.
- Three-dimensional Wave Propagation in Layered Media Containing Cracks or Thin Inclusions - Computational Modelling and Experimental Detection. Project FCT - POCTI/ECM/58940/2004, 2005-07 (Participants: C.J.S. Alves, S. Valtchev, P. Antunes).

- Project POCTI/MAT/45700/2002, 2003/09/01 - 2006/08/31 (extended until March 2007). Computational Methods for Singular Problems. P. Lima: PI. CEMAT Participants: T. Diogo, L. Morgado, M. Rebelo, F. Teodoro and S. Valtchev.
- QuantLog: Logic in Quantum Computation and Information, POCTI/MAT/55796/2004, 2005/01/01-2007/12/31. CEMAT Participants: A. Pacheco, C. Nunes.
- Project FCT - POCTI/MAT/60863/2004, Inverse problems and meshless methods in PDEs. C. J. S. Alves: PI. CEMAT Participants: A. L. Silvestre.
- Project FCT - POCTI/MAT/61792/2004, Analysis of mathematical models for the motion of rigid bodies in incompressible fluids. Ana Silvestre: PI.
- Project FCT - POCTI/ECM/58940/2004, Propagação tridimensional de ondas em meios estratificados contendo fissuras ou inclusões finas - modelação computacional e detecção experimental. Julieta António (FCT-UC): PI. CEMAT Participant: C. J. S. Alves.
- Programa Gulbenkian de Incentivo à Investigação 2007. Projecto: Método híbrido para o problema inverso de propagação elástica de ondas. P. Serranho: PI.
- Project FCT - PTDC/MAT/68166/2006, Multiscale Mathematical Models in Biomedicine [June 2007-May 2010], CEMAT/IST and IMM/FML. A. Sequeira: PI. CEMAT Participants: L. Borges, E. Sellountos, A. Moura, A.M. Artoli, A. Gambaruto, J. Janela.
- Bilateral Project Portugal/Italy, CEMAT/IST and IAC/CNR, Multiscale analysis and numerical simulation of mathematical models in hemodynamics and hemorheology [March 2007 - December 2008]. A. Sequeira: PI. CEMAT Participants: A.M. Artoli, J. Janela.
- Treaty of Windsor Programme, Portugal -UK , CEMAT/IST and University of Chester, Quality assurance of computer simulations of certain systems in the environmental and medical sciences. Local Coordinator: Pedro Lima. CEMAT Participants: T. Diogo, F. Teodoro, M. Rebelo.
- Project GRICES-EGIDE, Análise de problemas de interação fluido-estrutura. In collaboration with Institut Élie Cartan Nancy, France. A. L. Silvestre: PI.
- Eucalyptus Genomics Research Network for Improved Wood Properties and Adaptation to Drought (EUCANET), ERA-PG/0002/2006. Local Coordinator: A.M. Pires. CEMAT Participants: M. R. Oliveira, I. Rodrigues, and C. Amado.
- Euro-FGI - EU Network of Excellence, Design and Engineering of the Future Generation Internet - Towards Convergent Multi-Service Networks, 01/12/2006 - 30/05/2008. Local Coordinator: A. Pacheco. CEMAT Participants: C. Nunes, R. Oliveira, N. Antunes, F. Ferreira, H. Ribeiro.
- Statistical Genomics of Wood Properties in Eucalyptus Globulus Based on SNP Discovery, Gene Diversity and Association Studies, financed by FCT through Grant SFRH/BPD/21756/2005. Institutions involved: CEMAT/IST; University of Tasmania, Australia; RAIZ Forest and Paper Research Institute, Portugal. CEMAT Participants: A. M. Pires and J. Costa e Silva.
- Modelação do Tráfego do Aeroporto de Lisboa, Research and consultancy project for ANA, Aeroportos de Portugal, SA, 2005/10/01-2008/03/01. Coordinators: A. Pires, C. Nunes, A. Pacheco, R. Oliveira.
- QUAL+: Gestão da Qualidade de Serviço e do Desempenho do Atendimento, NITEC Project, financed by the 'Agência de Inovação', for R&D transfer. Joint project with the multinational company NEWVISION, 01/06/2006-30/06/2008. Local Coordinator: A. Pacheco. CEMAT Participants: C. Pascoal, M. R. Oliveira.
- MONSAIT: Internet Traffic Measurements, Modelling and Statistical Analysis, FCT Project POSC/EIA/60061/2004, Coordinated by Rui Valadas (Institute of Telecommunications), 01/01/2005 - 30/09/2008. Local Coordinator: A. Pacheco. CEMAT Participants: M.C.Morais, C. Nunes, R. Oliveira, N. Antunes, F. Ferreira, H. Ribeiro.

5 Publications in 2007

The following publications involving CEMAT members were published in 2007.

5.1 Books and Special Journal Issues (authored or edited)

- C. J. S. Alves (ed) Engineering Analysis with Boundary Elements - Special Issue on Meshless Methods, in press.
- A. Ferreira, I. Figueiredo, and J.H. Videman (eds) International Conference on Mathematics and Continuum Mechanics, CIM Preprint Series 30, 2008 (248 pp).
- M. Graça and P. Lima, Matemática Experimental, IST Press, Lisboa, 2007. In Portuguese.
- J. Janela, F. Carapau and A. Sequeira (eds), Mathematical Fluid Mechanics: A tribute to Giovanni P. Galdi on his 60th birthday (ISBN 989-20-549-2), 2007.
- V. M. A. Leitão, C. J. S. Alves and C. A. Duarte (eds), Advances in Meshfree Techniques, Computational Methods in Applied Sciences, Vol. 5., Springer, 2007. [ISBN: 978-1-4020-6094-6]
- A. M. Pires and J. A. Branco. Introdução aos Métodos Estatísticos Robustos (Introduction to Robust Statistical Methods). Edições SPE, Lisboa, 2007 (261 pp). In Portuguese.
- A. M. Pires and M. Souto de Miranda (Eds.). REVSTAT, Special issue on "Robust Statistics", 5(1), 20.
- Alfio Quarteroni and Fausto Saleri, Cálculo Científico com MATLAB e Octave, Springer, 2007, 320 pages, Portuguese translation: A. Sequeira.

5.2 Chapters/articles in books with refereeing

- C. J. S. Alves and S. S. Valtchev: A Kansa type method using fundamental solutions applied to elliptic PDEs, in Advances in Meshfree Techniques (eds: VMA Leitão et al.), Springer, New York, pp. 241-256, 2007.
- J. A. Branco and A. M. Pires. Poucos dados não é derrota e muitos dados não é vitória (A few data is no defeat and a lot of data is no victory). Ferrão, M. E., Nunes, C. and Braumann, C. A. (Eds.), Estatística, Ciência Interdisciplinar, Edições SPE, Lisboa, pp. 257-268, 2007. In Portuguese.
- F. Ferreira and A. Pacheco. An efficient approach to analyze finite buffer queues with generalized Pareto interarrival times and exponential service. In T. Dohi, S. Osaki, and K. Sawaki, editors, Recent Advances in Stochastic Operations Research, World Scientific, Singapore, pp. 205-224, 2007.
- P. Ferreira and J. Branco. Análise de Correspondências para variáveis ordinais aplicada aos dados do Estudo PISA (Correspondence Analysis for ordinal variables applied to PISA Report's data). In M. E. Ferrão, C. Nunes, and C. A. Braumann, Editors, Estatística, Ciência Interdisciplinar, Edições SPE, Lisboa, pp. 381-388, 2007. In Portuguese.
- P. Ferreira and J. Branco. Uma análise estatística do número de óbitos por tumor em Portugal (A statistical analysis of the number of deaths per tumor in Portugal). In G. E. Cunha and J. Varanda, Editors, Estatística e Qualidade na Saúde: Problemas e Temáticas, INE, Lisboa, pp. 39-44, 2007. In Portuguese.
- A. Pacheco and H. Ribeiro. Bursts and gaps of Markov renewal arrival processes. In T. Dohi, S. Osaki, and K. Sawaki, editors, Recent Advances in Stochastic Operations Research, World Scientific, Singapore, pp. 245-262, 2007.
- A. Sequeira and J. Janela, An overview of some mathematical models of blood rheology, in: A Portrait of Research at the Technical University of Lisbon, (ed: M.S. Pereira), Springer-Verlag, 65-87, 2007.

5.3 Articles in international journals

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5.4 Articles in proceedings of conferences

- C. J. S. Alves, P. R. S. Antunes: The Method of Fundamental Solutions Applied to the Calculation of Eigensolutions in 2D Plates. In: *Proceedings of the 2nd ECOMMAS Thematic Conference on Meshless Methods* (eds: A. Ferreira et al.), pp. 8-14, FEUP, Univ. Porto, 2007.
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- P. M. Lima and L. Morgado, Numerical approximation of singular boundary value problems for a nonlinear differential equation. In: Proceedings of the 11th International Conference on Differential Equations and Their Applications (Equadiff 11), Bratislava, 25-29 July 2005, pp. 201-211, 2007.
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- A. I. Sukov, K.V. Tregubov and P. M. Lima, Planar dielectric layered media: Guided localized electromagnetic structures and optical switches. In: Proceedings of the International Conference on Numerical Analysis and Applied Mathematics, American Institute of Physics, 936, pp. 539-542, 2007.
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6 Publications accepted in 2007

The following works involving CEMAT members were accepted for publication in 2007:

- C. J. S. ALves, M.J. Colaço, V.M.A. Leitão, N. M. F. Martins, H.R.B. Orlande and N.C. Roberty. Recovering the source term in a linear diffusion problem by the Method of Fundamental Solutions. *Inv. Probl. Sc. Eng.*, in press.
- C. J. S. ALves and A. B. Cruzeiro. Monte-Carlo simulation of stochastic differential systems - a geometrical approach. *Stoch. Proc. and their Appl.*, in press.
- C. J. S. Alves and N. F. M. Martins: Reconstruction of inclusions or cavities in potential problems using the MFS. In: *The Method of Fundamental Solutions - A Meshless Method* (eds.: A. Karageorghis et al.) TechScience Press, book to appear.
- N. Antunes, C. Fricker, P. Robert, D. Tibi. Stochastic networks with multiple stable points. *Annals of Probability*, 36(1):255-278, 2008.
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- A. Bianco, G. Boente, A. M. Pires, and I. M. Rodrigues. Robust discrimination under a hierarchy on the scatter matrices. *Journal of Multivariate Analysis*. In press.
- T. Bodnar and A. Sequeira, Numerical simulation of the coagulation dynamics of blood, *Computational and Mathematical Methods in Medicine*, in press.
- G. Boente, A. M. Pires, and I. M. Rodrigues. Estimators for the common principal components model based on reweighting: influence functions and Monte Carlo study. *Metrika*. In press.
- L. Borges and A. Sequeira, Numerical simulation of a viscoelastic fluid with a preconditioned Schwarz method, *Banach Center Publ., Inst. Math, Polish Acad. Sc., Warsaw*, in press.
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- N. Diniz dos Santos, J.F. Gerbeau, J.F. Bourgat A partitioned fluid-structure algorithm for elastic thin valves with contact *Comp. Meth. Appl. Mech. Engng.*, in press.
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- F. Ferreira and A. Pacheco. Analysis of $G\hat{I}X/M(n)//N$ systems with stochastic customer acceptance policy. *Queueing Systems*, 58(1):29-55, 2008.
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- J. Janela and A. Sequeira, On a constrained minimization problem arising in hemodynamics, *Banach Center Publ., Inst. Math, Polish Acad. Sc., Warsaw*, in press.

- P. Lima and L. Morgado, Analytical-numerical investigation of a singular boundary value problem for a generalized Emden-Fowler equation, *J. Comput. Appl. Math.*, in press.
- N. M. F. Martins and A. L. Silvestre. An iterative MFS approach for the detection of immersed obstacles, *Eng. Anal. Bound Elem*, in press.
- M. Morais, Y. Okhrin, A. Pacheco, and W. Schmid. EWMA charts for multivariate output: some stochastic ordering results, *Communications in Statistics - Theory and Methods*. In Press.
- A. Moura, Coupling multiscale fluid-structure interaction models for blood flow simulations. In: *Vascular Wall and Endothelium, Lisboa, 2007, Actas de Bioquímica, 7* (eds. J. Martins e Silva, Carlota Saldanha and J.F. Stoltz), in press.
- A. Pacheco and H. Ribeiro. Consecutive customer losses in oscillating $GI^X/M//n$ systems with state dependent services rates. *Annals of Operations Research*. In press.
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- A.M. Robertson, A. Sequeira and R. Owens, Rheological models for blood, In: *Cardiovascular Mathematics* (eds.: A. Quarteroni, L. Formaggia and A. Veneziani), Springer-Verlag, in press.
- A.M. Roberston, A. Sequeira and M. Kameneva, Hemorheology. In: *Hemodynamical Flows: Modeling, Analysis and Simulation by G.P. Galdi, R. Rannacher, A.M. Robertson and S. Turek*, Series: Oberwolfach Seminars, Birkhäuser Basel, in press.
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- A. Sequeira and J. Janela, A note on computational blood rheology, *PAMM - Proceedings in Applied Mathematics and Mechanics, ICIAM 07, Zurich 2007*, to appear.
- S. S. Valtchev and N. C. Roberty, A time-marching MFS scheme for heat conduction problems, *Eng. Analysis Bound. Elements*, 2007, in press.
- J. H. Videman and S.A. Nazarov, The refined non-linear Reynolds' equation for a thin flow of a viscous incompressible fluid, *Vestnik St. Petersburg University: Mathematics*, to appear.

7 Research Lectures

During 2007, CEMAT members gave the scientific talks listed below as: invited lectures at scientific events, external seminars, and communications at conferences/workshops with no associated publication.

7.1 Invited Lectures

- N. Antunes. Queues in multiservice communication networks. SPE/CIM Meeting on Probability and Statistics, May 19, 2007, Coimbra, Portugal.
- F. Ferreira. Level-crossing ordering and applications to Markovian queueing systems. SPE/CIM Meeting on Probability and Statistics, May 19, 2007, Coimbra, Portugal.
- M.R. Oliveira. Multivariate Analysis in the characterization of Internet users. SPE/CIM Meeting on Probability and Statistics, May 19, 2007, Coimbra, Portugal.
- A.L. Silvestre. On the detection of an immersed rigid body by boundary measurements. International Conference of Theoretical and Numerical Fluid Mechanics III, August 13-17, 2007, Vancouver, Canada.
- A.L. Silvestre. On the existence of time-periodic motions of a rigid body in a Navier-Stokes liquid. International Workshop on Fluid-Structure Interaction Problems, October 30 - November 2, 2007, Prague, Czech Republic.
- A.L. Silvestre. On the existence of time-periodic motions of a rigid body in a Navier-Stokes liquid. Oberwolfach Mini-Workshop "Theory and Numerics of Fluid-Structure Interaction", November 25 - December 1, Mathematisches Forschungsinstitut Oberwolfach (MFO), Germany.

7.2 External seminars

- N. Diniz dos Santos. Partitioned FSI strategy for the numerical simulation of thin elastic valves. GTT, Paris, France, January 2007.
- António Pacheco. Stochastic Ordering of first passage times: some contributions in Statistical Process Control and in the Level Crossing Ordering of stochastic processes. University of Athens, Athens, Greece, February 13, 2007.
- António Pacheco. Stochastic Ordering of first passage times: some contributions in Statistical Process Control and in the Level Crossing Ordering of stochastic processes. Nagoya Institute of Technology, Nagoya, Japan, March 7, 2007.
- J.H. Videman. Introduction to the PDEs of Geophysical Fluid Dynamics. Faculty of Engineering, University of Porto, May 7, 2007.
- J.H. Videman. A nonlinear Reynolds equation for thin viscous flows. Department of Mathematics, UT Austin (USA), October 29, 2007.
- B. Pereira. Introdução à Dinâmica dos Fluidos Geofísicos. Instituto Superior de Engenharia de Lisboa, November 30, 2007.

7.3 Communications at conferences/workshops with no publication

- F. Ferreira, A. Pacheco, and H. Ribeiro. Service oscillating $G1^X/M(n)-M(n)/N$ queueing systems. Euro-FGI Workshop on New Trends in Modelling, Quantitative Methods and Measurements, May 31 - June 01, 2007, Ghent, Belgium.
- C.J.S. Alves and S.S. Valtchev. The Plane Waves Method as an asymptotic MFS 2007, June 11-13, 2007, Ayia Napa, Cyprus.
- A.L. Silvestre. The method of fundamental solutions for the Stokes equations. Application to direct and inverse problems. MFS 2007, June 11-13, 2007, Ayia Napa, Cyprus.
- J.H. Videman. A nonlinear Reynolds equation for thin viscous flows. International Summer School and Conference on Advanced Problems in Mechanics, June 25, 2007, St. Petersburg, Russia.

- F. Ferreira and A. Pacheco. Level-crossing ordering of semi-Markov jump processes and applications to Whittle Networks. 14th Applied Probability Society of INFORMS Conference, July 9-11, 2007, Eindhoven, The Netherlands.
- A. Pacheco and H. Ribeiro. Moments of the duration of busy periods in oscillating queueing systems. 14th Applied Probability Society of INFORMS Conference, July 9-11, 2007, Eindhoven, The Netherlands.
- N. Antunes, G. Jacinto, and A. Pacheco. Connectivity probability of one-dimensional ad hoc wireless networks with minimum hop path. 14th Applied Probability Society of INFORMS Conference, July 9-11, 2007, Eindhoven, The Netherlands.
- N. Diniz dos Santos. FSI partitioned approach for simulating elastic valves. CEMRACS'07, July 23- August 31, 2007, Marseille, France.
- F. Encarnação, M. R. Oliveira, and L. Gonçalves. Comparação de testes de diagnóstico usando uma abordagem bayesiana. XV Annual Meeting of the Portuguese Statistical Society, August 19–21, 2007, Lisboa, Portugal.
- J. Branco, E. Encarnação, L. Gonçalves, and M. R. Oliveira. The Role of Statistics in Validation of Diagnostic Tests for Leishmaniasis. 56th Session of the International Statistics Institute, August 22-29, 2007, Lisbon, Portugal.
- C. Pascoal, M. R. Oliveira, A. Pacheco, R. Valadas, and P. Salvador. Dependencies between Internet flow rates and other flow characteristics. 56th Session of the International Statistics Institute, August 22-29, 2007, Lisbon, Portugal.
- T. Diogo. Numerical solution of a nonlinear singular integral equation. HERCMA 2007: 11th Hellenic European Conference on Computer Mathematics and its Applications, September 20-22, 2007, Athens, Greece.
- M.F. Teodoro. Existence of solution and numerical methods for forward-backward equations. HERCMA 2007: 8th Hellenic European Research on Computer Mathematics & its Applications Conference, September 20-22, 2007, Athens University of Economics and Business, Athens, Greece.
- M. Rebelo, T. Diogo, and S. McKee. Modelling a competitive antibody/antigen chemical reaction. International Workshop on Numerical Analysis and Computational Methods for Functional Differential and Integral Equations, December 3-6, 2007, Hong-Kong Baptist University, Hong Kong, China.
- M.F. Teodoro. A new approach to the numerical solution of forward-backward equations. BUDDE 2007: International Workshop on Numerical Analysis and Computational Methods for Functional Differential and Integral Equations, December 3-6, 2007, Hong Kong Baptist University, China.

8 Seminar Series

CEMAT organized during 2007 the seminar talks listed below.

8.1 CEMAT Open Seminar and Colloquium

- Rainer Kress, University of Gottingen, Numerical Methods in Inverse Obstacle Scattering, 27/09/2007.
- Juan A. Acebron, Departament d'Enginyeria Informàtica i Matemàtiques, Universitat Rovira i Virgili, Tarragona, Spain, *New algorithms in computational mathematics suited for next-generation supercomputers*, 12/10/2007.
- Rhonda Righter, University of California at Berkeley, *Scheduling in Highly Uncertain Environments*, 18/12/2007.

8.2 Applied Mathematics and Numerical Analysis Seminar

- Arvet Pedas, Institute of Applied Mathematics, University of Tartu, Estonia, *Smoothing and spline collocation for weakly singular Volterra integro-differential equations*, 7/02/2007.
- Murilo Tomé, Instituto de Ciências Matemáticas e Computação, Universidade de S. Paulo, S. Carlos, *Numerical simulation of viscoelastic free surface flows governed by the PTT constitutive equation: 2D and 3D flows*, 14/03/2007.
- Nilson C. Roberty, Universidade Federal do Rio de Janeiro, *Identification of star shaped sources from boundary measurements*, 15/03/2007.
- Giovanni Paolo Galdi, University of Pittsburgh, USA, *Navier-Stokes Equations: The Beauty and the Beast*, 11/04/2007.
- Neville Ford, Department of Mathematics, University of Chester, United Kingdom, *Numerical Solution of Distributed Order Differential Equations*, 18/04/2007.
- Dmitry Struin, Department of Mathematics and Computing, University of Southern Queensland, Australia, *Attractors in confined source problems for coupled nonlinear diffusion*, 18/04/2007.
- Pedro Serranho, Inst. Politécnico de Leiria (ESTG) and CEMAT-IST, *Um Método Híbrido para Problemas Inversos de Difração Acústica*, 31/05/2007.
- Giuseppe Pontrelli, IAC-CNR, Roma, Italia, *Mathematical modelling of mass dynamics for arterial drug-eluting stents*, 20/06/2007.
- Evgeny Lakshtanov, Universidade de Aveiro, Portugal, *Scattering by obstacles and wave problem of minimal resistance*, 24/07/2007.
- Liudmila Uvarova, Moscow State University of Technology, Department of Applied Mathematics, *Some Model Problems of Modern Nonlinear Science*, 24/07/2007.
- Marius Tucsnak, Institut Élie Cartan - Université de Nancy, *Fast and strongly localized observation for the Schrödinger equation in a rectangular domain*, 10/10/2007.
- Andrei Bourchtein, Universidade Federal de Pelotas (Brasil), *On some mathematical and computational problems of atmosphere modeling*, 12/10/2007.
- Luca Formaggia, MOX, Politecnico di Milano, Italy, *Modelling the cardiovascular system: the interplay of different techniques*, 19/10/2007.
- Fabio Nobile, MOX, Politecnico di Milano, Italy, *Fluid-structure interaction algorithms for vascular dynamics based on Robin interface conditions*, 19/10/2007.
- Giuseppe Pontrelli, IAC-CNR, Roma, Italy, *Blood flow in bends: models, methods and simulations*, 24/10/2007.
- João Janela, CEMAT-IST and ISEG, *Numerical Experiments in Blood Rheology*, 14/11/2007.
- Alberto Gambaruto, Imperial College, London, UK, *Form and flow in the nasal cavity*, 21/11/2007.
- Nejla Hariga, LAMSIN-ENIT & INAT, Tunisie, *A Data Completion Problem in ElectroCardioGraphy*, 28/11/2007.
- Nuno Martins, CEMAT-IST and FCT/UNL, *On the identification and reconstruction of sources in a potential problem from boundary*, 5/12/2007.
- Magda Rebelo, FCT/UNL and CEMAT-IST, *Mathematical Model of a Chemical Reaction Within a Small Cell, with Applications in Biosciences*, 12/12/2007.
- Filomena Teodoro, EST/IPS and CEMAT-IST, *Numerical Methods for Mixed Type Functional Equations*, 19/12/2007.

8.3 Probability and Statistics Seminar

- Eduardo Luis Trincão da Conceição, Dep. Engenharia Química, Univ. Coimbra, *A reconciliação de dados, o erro de medição com viés, o estimador robusto LTD, o engenheiro, e uma ideia dele*, 24/01/2007.
- Luís Filipe Meira Machado, Dep. Matemática para a Ciência e Tecnologia, Universidade do Minho, *New methods in multi-state models*, 7/02/2007.
- Antonis Economou, University of Athens, *Pricing and equilibrium behavior for a Markovian queue with server vacations*, 12/06/2007.
- Fátima Ferreira, UTAD (Universidade de Trás-os-Montes e Alto Douro) and CEMAT-IST, *Ordenação em excedência de nível e aplicações*, 21/09/2007.
- Manuel Cabral Morais, DM and CEMAT-IST, *Stochastic Ordering: from the Lorenz curve to Quality Control*, 27/09/2007.
- Vladas Pipiras, University of North Carolina at Chapel Hill, USA, *Some research problems on long range dependence*, 18/10/2007.
- Gualter Couto, Universidade dos Açores, *Instante Ótimo de Relocalização*, 26/10/2007.
- Nelson Antunes, Universidade do Algarve and CEMAT-IST, *Modelação Estocástica em redes de telecomunicações*, 2/11/2007.
- Ana Luísa Papoila, Faculdade de Ciências Médicas da Universidade Nova de Lisboa e CEAUL, *Modelos Aditivos Generalizados com função de ligação flexível*, 7/11/2007.
- Helena Ribeiro, Instituto Politécnico de Leiria and CEMAT-IST, *Filas de espera oscilantes $M/G/1/n$ e $GI/M(m)//n$ com chegadas em grupo*, 22/11/2007.
- Philippe Robert, INRIA, *Analysis of a Stochastic Model for Flash Crowd Scenarios*, 6/12/2007.
- Conceição Amado, DM and CEMAT-IST, *Métodos de reamostragem para a estimação de medidas de precisão em sondagens*, 14/12/2007.

9 Organization of scientific events

CEMAT members were involved in the organization of the following scientific events during 2007:

- SPE/CIM Meeting on Probability and Statistics in Telecommunications, Coimbra - Portugal, May 19, 2007. A. Pacheco: Organizer.
- International Conference on Mathematical Fluid Mechanics: A tribute to G. P. Galdi on his 60th birthday, Estoril, Portugal, May 21-25, 2007 (A. Sequeira, F. Carapau and J. Janela: co-organizers; A. Sequeira: chairman and member of the Scientific Committee).
- Euro-FGI Workshop on New Trends in Modelling, Quantitative Methods and Measurements, Ghent - Belgium, May 31 - June 1, 2007. A. Pacheco: President of the Session on Resource Allocation and Scheduling.
- Sixth International Conference on Matrix Analytic Methods in Stochastic Models, Beijing - China, June 11-14, 2008. A. Pacheco: member of the Scientific Advisory Committee.
- 2nd ECOMMAS Thematic Conference on Meshless Methods. July 9-11, 2007, FEUP, Univ. Porto, Portugal (C. J. S. Alves: member of the scientific committee).

- Lisbon Quantum Computation, Information and Logic Meetings Series: Workshop on Quantum Cryptography and Security, LQCIL'07, 2007, Lisbon, Portugal (C. Nunes: member of the organization committee)
- Third Conference on Next Generation Internet Networks – Design and Engineering for Heterogeneity, Trondheim - Norway, May 21-23 2007. (A. Pacheco: member of the Technical Program Committee)
- SMCtools 2007 International Workshop on Tools for solving Structured Markov Chains, Nantes - France, October 26, 2007. (A. Pacheco: member of the Technical Program Committee).

10 Academic degrees awarded in 2007

The following five Ph.D.'s and seven M.Sc.'s awarded in 2007 were defended or supervised by CEMAT members.

10.1 Doutoramentos/Ph.D.'s

- Fátima Ferreira. Embedding Uniformization and Stochastic Ordering in the Analysis of Level-Crossing Times and $G\hat{I}^X/M(n)/c$ Systems. PhD Thesis, IST/UTL, Lisboa, 2007. Supervised by A. Pacheco.
- Alexandra Bugalho de Moura. The geometrical multiscale modelling of the cardiovascular system: coupling 3D FSI and 1D models. PhD Thesis, MOX-Dipartimento di Matematica "F. Brioschi", Politecnico di Milano, 2007. Supervised by Luca Formaggia.
- Helena Ribeiro. Customer Loss Probabilities and Other Performance Measures of Regular and Oscillating Systems. PhD Thesis, IST/UTL, Lisboa, 2007. Supervised by A. Pacheco.
- Nuno Diniz dos Santos. Numerical methods for fluid-structure interaction problems with valves, PhD thesis, University of Paris VI, 2007. Supervised by Jean-Frédéric Gerbeau and Yvon Maday.
- Pedro Serranho. A hybrid method for inverse obstacle scattering problems. PhD Thesis, University of Göttingen, 2007. Supervised by Rainer Kress.

10.2 Mestrados/M.S.c.'s

- Catarina Rego. Métodos Robustos em Amostragem em Populações Finitas (Robust Methods in Finite Population Sampling). MSc thesis, IST/UTL, Lisboa, 2007. Supervised by C. Amado. In Portuguese.
- Cláudia Pascoal. Distribuição Normal Bivariada Truncada com Aplicação ao Estudo de Fluxos de Tráfego de Internet (The Truncated Bivariate Normal Distribution with Applications to the Analysis of Internet Flows). MSc thesis, IST/UTL, Lisboa, 2007. Supervised by M. R. Oliveira. Co-supervised by A. Pacheco. In Portuguese.
- Carla Santos. Modelo de Regressão Logística no Estudo da Obesidade em Portugal (Logistic Regression Model in the Study of Obesity in Portugal). MSc thesis, IST/UTL, Lisboa, 2007. Supervised by C. Amado. In Portuguese.
- Alexandra Silva. Previsão do Rendimento da Madeira do Eucalyptus Globulus com Base em Espectroscopia NIR (Prediction of Pulp Rentability of Eucalyptus Globulus Based on NIR Spectroscopy). MSc thesis, IST/UTL, Lisboa, 2007. Supervised by M. R. Oliveira. In Portuguese.

- Bruno Silva. *Análise de Opções Reais no Processo de Relocalização (Analysis of Real Options in Relocalization)*. MSc thesis, IST/UTL, Lisboa, 2007. Supervised by C. Nunes; Co-supervised by G. Couto. In Portuguese.
- Tânia Silva. *Statistical Models to Predict Electricity Prices*. MSc thesis, IST/UTL, Lisboa, 2007. Supervised by C. Nunes; Co-supervised by A. Pacheco.
- André Vasconcelos. *Detection of External Sound Sources Through Measurements of Amplitude in a Body Surface*, Master's thesis, IST/UTL, Lisbon, 2006. Supervised by C. J. S. Alves.

CEAF Report 2007
Department of Mathematics
Instituto Superior Técnico
Portugal

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1 Introduction

The Center for Functional Analysis and Applications-CEAF is aimed at developing research in the area of Functional Analysis keeping in view applications to other areas of Mathematics and also to Physics and Engineering.

The center was founded in 2006 by initiative of a group of researchers from the Instituto Superior Técnico and the University of Algarve who formerly had been members of the Center for Mathematics and Applications. The main reason behind the creation of the Center was to have clearly focused scientific objectives leading to higher visibility of our research in the area.

Presently, the center possesses twenty three doctorate members and the main research interests include topics such as

- Riemann-Hilbert Problems and Factorization,
- Operator Algebras and Index Theory,
- Operator Methods in Boundary-Value Problems,
- Toeplitz Operators and Corona Problems,
- Singular Integral Operators with Shifts,
- Harmonic Analysis and Operator Theory.

The list of members of CEAF in 2007 is the following:

PhD members:

Amarino Lebre
Ana Moura Santos
António Ferreira dos Santos
António Bravo
Catarina Carvalho
Cláudio Fernandes
Frank-Olme Speck
Helena Mascarenhas
Juan Rodriguez
Lina Oliveira
Luís Pessoa
Maria Amélia Bastos
Maria Cristina Câmara
Natasha Samko
Nuno Cirilo António
Oleksiy Karlovich
Paulo Lopes
Pedro Simões dos Santos
Rui Marreiros
Sofia Naique
Stefan Samko
Viktor Kravchenko

Post-graduate students:

Ana Isabel Conceição Guerra
Cristina Diogo
Humberto Gil Silva Rafeiro
Rui Domingos Rosado dos Reis

2 Publications in 2007

2.1 Chapters/articles in books with international refereeing

- A. Karlovich, Higher order asymptotic formulas for traces of Toeplitz matrices with symbols in Hölder-Zygmund spaces. *Operator Theory: Advances and Applications. Recent Advances in Matrix and Operator Theory*, 179 (2007), 185-196.
- N.G. Samko, Singular integral operators in weighted spaces of continuous functions with oscillating continuity moduli and oscillating weights. *Operator Theory: Advances and Applications*, 151 (2007), 323-347.

2.2 Articles in international journals

- A. Almeida, S. Samko, Pointwise inequalities in variable Sobolev spaces and applications. *Zeit. Anal. Anwend.*, 26 (2007), 179-193.
- M.A. Bastos, C.A. Fernandes, Yu.I. Karlovich, Spectral measures in C^* -algebras of singular integral operators with shifts. *J. Funct. Anal.*, 242 (2007), 86-126.
- A. Böttcher, A. Karlovich, B. Silbermann, Generalized Krein algebras and asymptotics of Toeplitz determinants. *Methods of Functional Analysis and Topology*, 13 (2007), 236-261.
- M.C. Câmara, A.F. dos Santos, P.F. dos Santos, Lax equations, factorization and Riemann-Hilbert problems. *Portugaliae Mathematica*, 64 (2007), 509-533.
- L. Diening, S. Samko, Hardy inequality in variable exponent Lebesgue spaces. *Fract. Calc. Appl. Anal.*, 10 (2007), 1-18.
- A. Karlovich, Asymptotics of determinants and traces of Toeplitz matrices with symbols in weighted Wiener algebras. *Zeitschrift für Analysis und ihre Anwendungen*, 26 (2007), 43-56.
- A. Karlovich, Asymptotics of block Toeplitz determinants generated by factorable matrix functions with equal partial indices. *Math. Nachr.*, 280 (2007), 1118-1127.
- A. Karlovich, Semi-Fredholm singular integral operators with piecewise continuous coefficients on weighted variable Lebesgue spaces are Fredholm. *Operators and Matrices*, 1 (2007), 427-444.
- Yu.I. Karlovich, L. Pessoa, C^* -algebras of Bergman type operators with piecewise continuous coefficients. *Integral Equations and Operator Theory*, 57 (2007), 521-565.
- V. Kokilashvili, S. Samko, On a generalization of Calderon-Zygmund's theorem in weighted Lebesgue spaces with variable exponent. *Bull. Georgian Nat. Acad. Sci.*, 175 (2007), 34-39.
- V. Kokilashvili, N. Samko, S. Samko, Singular operators in variable spaces $L_p(\cdot)(\Omega, p)$ with oscillating weights. *Math. Nachr.*, 280 (2007), 1145-1156.
- V. Kokilashvili, N. Samko, S. Samko, The maximal operator in weighted variable spaces $L^{\wedge} p(\cdot)$. *J. Function Spaces and Appl.*, 5 (2007), 299-317.

- V.G. Kravchenko, A.B. Lebre, J.S. Rodríguez, Factorization of Singular integral operators with a Carleman shift via factorization of matrix functions: the anticommutative case. *Math. Nachr.*, 280 (2007), 1-19.
- V. Rabinovich, S. Samko, Essential spectra of pseudodifferential operators in Sobolev spaces with variable smoothness and variable Lebesgue indices. *Doklady Mathematics*, 76 (2007), 835-838.
- H. Rafeiro, S. Samko, On a class of fractional type integral equations in variable exponents spaces. *Fract. Calc. and Appl. Anal.*, 10 (2007), 399-421.
- N. Samko, S. Samko, B. Vakulov, Weight Sobolev theorem in Lebesgue spaces with variable exponents. *J. Math. Anal. Appl.*, 335 (2007), 560-583.
- N. Samko, B. Vakulov, Spherical potentials of complex order in weighted generalized Holder spaces with radial oscillating weights. *Operator and Matrices*, 1 (2007), 283-300.
- N. Samko, Solutions of singular integral equations in function spaces of continuous functions with weights and end points. *Math. Problems in Engineering and Aerospace Sciences*. (2007), 687-694.
- S. Samko, E. Shargorodsky, B. Vakulov, Weighted Sobolev theorem with variable exponent for spatial and spherical potential operators II. *J. Math. Anal. Appl.*, 325 (2007), 745-751.

2.3 Articles/communication in proceedings of conferences

- D. Israfilov, V. Kokilashvili, S. Samko, Approximation in weighted Lebesgue and Simirnov classes with variable exponents. *Proc. A. Razmadze Math. Inst.*, 143 (2007), 25-35.
- A. Karlovich, Asymptotics of Toeplitz determinants generated functions with Fourier coefficients in weighted Orlicz sequence classes. *Contemporary Mathematics. Proceedings of the 5th Conference on Function Spaces*. 435 (2007), 229-243.
- V. Kokilashvili, S. Samko, A general approach to weighted boundedness of operators of harmonic analysis in variable exponent Lebesgue spaces. *Proc. A. Radmadze Math. Inst.*, 145 (2007), 109-116.
- N. Samko, Parameter depending Bary-Stechkin classes and local dimensions of measure metric spaces. *Proc. A. Razmadze Math. Inst.*, 145 (2007), 109-116.

3 Publications accepted in 2007

3.1 Books

- M. A. Bastos, I. Gohberg, A. Lebre, F.-O. Speck, *Operator Algebras, Operator Theory and Applications*, Operator Theory: Advances and Applications, 181, Birkhäuser, Basel, to appear.

3.2 Articles

- A. Almeida, J. Hasanov, S. Samko, Maximal and potential operators in variable exponent Morrey spaces. *Georgian Math. J.*, to appear.
- M.A. Bastos, P. A. Lopes, A. Moura Santos, The two straight-line approach and periodic diffraction boundary-value problems. *J. Math. Anal. Appl.*, to appear.
- M.A. Bastos, C.A. Fernandes, Yu. Karlovich, C^* algebras of integral operators with shifts having the same nonempty set of fixed points. *Complex Analysis and Operator Theory*, to appear.
- M.C. Câmara, M.C. Martins, Explicit almost-periodic factorization for a class of triangular matrix functions. *Journal d'Analyse Mathématique*, to appear.

- M.C. Câmara, A.F. dos Santos, P.F. dos Santos, Matrix Riemann-Hilbert problems and factorization on Riemann surfaces. *J. Funct. Anal.*, to appear.
- L. Castro, R. Duduchava, F.-O. Speck, Solvability of singular integro-differential equations with multiple complex shifts. *Complex Analysis and Operator Theory*, to appear.
- A. Conceição, V.G. Kravchenko, About explicit factorization of some classes of non-rational matrix functions. *Math. Nachr.*, to appear.
- A. Karlovich, Higher order asymptotic formulas for Toeplitz matrices with symbols in generalized Hölder spaces. *Operator Theory: Advances and applications*, to appear.
- Yu.I. Karlovich, L. Pessoa, C^* -algebras of Bergman type operators with piecewise continuous coefficients on bounded domains. *Proceed. of 5th Congress of ISAAC, Catania*, to appear (2007).
- V. Kokolashvili, S. Samko, Singular operators and Fourier multipliers in weighted Lebesgue spaces with variable exponents. *Vestnik of Saint-Petersburg University*, to appear.
- V. Kokolashvili, S. Samko, Vekua's generalized singular integral on Carleson curves in weighted variable Lebesgue spaces. *Operator Algebras, Operator Theory and Applications*, to appear.
- V.G. Kravchenko, R.C. Marreiros, On the kernel of some one-dimensional singular integral operators with shift. *Operator Theory: Advances and Applications*, to appear.
- V.G. Kravchenko, A.B. Lebre, J.S. Rodríguez, Matrix functions pseudosimilar to the identity and singular integral operators. *Complex Analysis and Operator Theory*, special issue dedicated to the memory of Georgii Semenovich Livinchuk, to appear.
- V. Rabinovich, S. Samko, PDO boundedness and Fredholmness of pseudodifferential operators in variable exponent spaces. *Integr. Equ. Oper. Theory*, to appear (2007).
- H. Rafeiro, S. Samko, Characterization of the range of one-dimensional fractional integration in the space with variable exponent. *Operator Algebras, Operator Theory and Applications*, to appear.
- H. Rafeiro, S. Samko, Dominated compactness theorem in Banach function spaces and its applications, *Complex Analysis and Applications*, to appear.
- N.G. Samko, Upper and lower indices of a certain class of monotonic functions in connection with Fredholmness of singular integral operators. *Proceed of 5th Congress of ISAAC, Catania*, to appear.
- N. Samko, Parameter depending almost monotonic functions and their applications to dimensions in metric measure spaces. *J. Function Spaces and Appl.*, to appear.

4 Research Lectures

- M. A. Bastos,
 - *An invertibility criterion for C^* algebras of functional operators with shifts*, 6th International ISAAC Congress, Ankara, Turkey, 13 - 18 August 2007.
- M. Cristina Câmara,
 - M. C. Câmara, co-author C. Diogo, *Invertibility of Toeplitz operators with analytic symbols and corona conditions*, First Joint International Meeting between the AMS and the PTM, Warsaw, Poland, 31 July - 3 August 2007.
 - M. C. Câmara, *On a class of Riemann-Hilbert problems with almost periodic polynomials*, The RAEx Oxford Symposium, Oxford, U.K., 13 -15 August 2007.
 - M. C. Câmara, *Finite interval difference equations, Riemann-Hilbert problems and Wiener-Hopf factorization*, Akademia Rolnicza w Krakowie, Cracóvia, Polónia, 26 July 2007.

- Alexei Karlovich,
 - *Generalized Krein algebras and asymptotics of Toeplitz determinants*, International Conference, Modern Analysis and Applications (MAA 2007), dedicated to the centenary of Mark Krein, Ukraine, Odessa, April 9-14, 2007.
 - *Singular integral operators on variable Lebesgue spaces with weights*, International Workshop on Operator Theory and Applications, IWOTA-2007, South Africa, Potchefstroom, North-West University, July 3-6, 2007.
 - *Generalized Krein algebras, Besov spaces and asymptotics of Toeplitz determinants*, Seminar on functional analysis, Universidade de Aveiro, March 29, 2007.
 - *Singular integral operators on generalized Lebesgue spaces with variable exponent*, Seminário de Equações Diferenciais e Física Matemática, Universidade do Minho, Braga, May 30, 2007.
- Ana Moura,
 - *Online Precalculus for Undergraduate Students*, e+Calculus JEM Workshop 1, 8 - 10 February, 2007 Department of Mathematics Faculdade de Ciências Universidade de Lisboa Portugal.
 - *Interactive Learning Objects for Linear Algebra*, e+Calculus JEM Workshop 1, 8 - 10 February, 2007 Department of Mathematics Faculdade de Ciências Universidade de Lisboa Portugal.
 - *Periodic Diffraction Boundary-value Problems and Toeplitz Operators*, ISAAC 2007 Middle East Technical University, Ankara, Turkey 13 – 18 August 2007.
- Juan Rodriguez ,
 - Solution of a generalized "Riemann boundary value problem with a Carleman shift in the real line", Fourth Advanced Course in Operator Theory and Complex Analysis, Universidad de Sevilla, Spain, 18 - 20 June 2007.
- N. Samko,
 - Indices of almost monotonic functions depending on a parameter and their applications to Holder spaces of variable order. INTAS Workshop, *Variable Exponent Analysis*, Baku, Azerbaijan, 16-17 de May, 2007.
 - *Parameter depending Matuszewska-Orlicz tipe indices and their applications*, Conference IC-NAAM, Corfu, Greece, 16-20 de September, 2007.
 - *Weighted Hardy and singular operators in Morrey spaces*, Seminar Functional Analysis and Applications, Departamento de Matemática, Universidade do Aveiro, 22 de Novembro, 2007.
- S. Samko,
 - On weighted estimates of maximal, singular and potential operators in variable exponent space, INTAS Workshop "Variable Exponent Analysis", Baku, Azerbaijan, 16-17 May, 2007.
 - Weighted estimates for the maximal operator in the variable exponent spaces on metric measure spaces, 6^o Congresso de ISAAC (International Society for Analysis, Applications and Computation), Ankara, Turkey, 13-18 August, 2007.
 - On generalized potential operators in variable exponent spaces. Seminar on Math. Analysis and Function Theory, A. Razmadze Math. Inst., Tbilisi, Georgia, 23 October, 2007.
- Frank-Olme Speck,
 - Mixed boundary value problems for the Helmholtz equation in a quadrant, Universität Kassel, 20.8.2007.
 - Boundary value problems for the Helmholtz equation in an octant, Seminar on Harmonic Analysis, Operator Theory and Applications, Universidade do Algarve, Faro, 11.12.2007.

5 Seminar Series

5.1 Functional Analysis and Applications

- Yuri I. Karlovich (Universidad Autónoma del Estado de Morelos, México), *Wiener-Hopf operators with matrix oscillating symbols on weighted Lebesgue spaces*, 21/12/07.
- Martin Costabel (Université de Rennes 1, França), *Computing edge singularity coefficients*, 14/12/07.
- Frank-Olme Speck (Instituto Superior Técnico, U.T. Lisboa), *Boundary value problems for the Helmholtz equation in an octant*, 30/11/07.
- Giorgi Bogveradze (Universidade de Aveiro), *Toeplitz plus Hankel operators with infinite index*, 9/11/07.
- Luís Castro (Universidade de Aveiro), *Wave diffraction by a 45 degrees wedge sector with Dirichlet and Neumann boundary conditions*, 9/11/07.
- Amélia Bastos (Instituto Superior Técnico, U.T. Lisboa), *An invertibility criterion for a non local C^* algebra of functional operators*, 22/10/07.
- Stefan Samko (Universidade do Algarve, Faro), *Classical operators of harmonic analysis in Lorentz spaces with variable exponent*, 12/10/07.
- Bernd Silbermann (Technische Universität Chemnitz, Germany), *Finite sections of band-dominated operators: p -theory*, 21/9/07.
- Alexei Yu. Karlovich (CEAF, Instituto Superior Técnico, U.T. Lisboa), *Singular integral operators on variable Lebesgue spaces with radial oscillating weights*, 14/9/07.
- João de Deus Marques (Universidade Nova de Lisboa), *On vectorial inner product spaces*, 13/7/07.
- Yuri I. Karlovich (Universidad Autónoma del Estado de Morelos, México), *C^* -algebras of singular integral operators with shifts having the same nonempty set of periodic points*, 6/7/07.
- Ana Paula Nolasco (Universidade de Aveiro), *A Fredholm characterization for Wiener-Hopf-Hankel operators with semi-almost periodic symbols*, 29/6/07.
- Ilya Spitkovsky (College of William and Mary, Williamsburg, Virginia, USA), *Spectra of some Toeplitz operators with almost periodic matrix symbols*, 29/6/07.
- Alexei Karlovich (Centro de Análise Funcional e Aplicações, Lisboa), *Semi-Fredholm singular integral operators with piecewise continuous coefficients on weighted variable Lebesgue spaces are Fredholm*, 1/6/07.
- Amarino Lebre (Instituto Superior Técnico, U.T. Lisboa), *Factorization of singular integral operators with a Carleman backward shift: the case of bounded measurable coefficients*, 18/5/07.
- Juan Carlos Sanchez Rodríguez (Universidade do Algarve, Faro), *Factorization of singular integral operators with a Carleman backward shift: the case of continuous coefficients*, 4/5/07.
- Natasha G. Samko (Centro de Análise Funcional e Aplicações, Faro), *Indices of almost monotonic functions depending on a parameter and their applications to Hölder spaces of variable order*, 27/4/07.
- Stefan G. Samko (Universidade do Algarve, Faro), *On variable exponent analysis on homogeneous spaces*, 20/4/07.
- Alexei Karlovich (Instituto Superior Técnico, U.T. Lisboa), *Asymptotics of Toeplitz matrices with symbols in generalized Hölder spaces*, 16/3/07.

- Anatoli Merzon (Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Mexico), *About the scattering of plane waves by wedges*, 9/3/07.
- Roland Duduchava (A. Razmadze Mathematical Institute, Academy of Sciences, Tbilisi, Georgia), *Boundary value problems for shell equations*, 2/3/07.
- Teresa Malheiro (Universidade do Minho, Guimarães), *Meromorphic factorization revisited and application to a group of matrices*, 26/1/07.
- Catarina Carvalho (Instituto Superior Técnico, U.T. Lisboa), *The Fredholm index in K-theory for C*-algebras*, 19/1/07.
- Alexei Karlovich (Instituto Superior Técnico, U.T. Lisboa), *Generalized Krein algebras and asymptotics of Toeplitz determinants*, 12/1/07.

6 Participation in research projects

- Non-local Operator Algebras. Related Operator Corona Problems and Applications, FCT/FEDER/POCTI/MAT/59972/04, 2005-2008, Coordinator: M. Amélia Bastos.
- Toeplitz Operators, Factorization and Corona Problems, IST/UTL, PTDC/MAT/81385/2006, Coordinator: M. Cristina Câmara.
- Variable Exponent Analysis, Universidade do Algarve (2007/2008), INTAS (Brussels), Ref Nr 06-000017-8792, Coordinator: Stefan Samko.

7 Academic degrees awarded in 2007

7.1 Doutoramentos/Ph.D.'s

- Ana Conceição, *Factorização de algumas Classes de Funções Matriciais e suas Aplicações*, Orientador: V. Kravchenko, UALG.

7.2 Mestrados/M.A's/M.S.c.'s

- Annabela Pelicano, *Factorização de uma Classe de Símbolos Oscilatórios e Problemas de Riemann-Hilbert*, Orientador: Cristina Câmara, I.S.T.

1 Publications

1.1 Journal papers

- [1] P. Adão and P. Mateus. A process algebra for reasoning about quantum security. *Electronic Notes in Theoretical Computer Science*, 170:3–21, 2007. Preliminary version to be presented at 3rd International Workshop on Quantum Programming Languages, June 30 - July 1, 2005, Chicago, Affiliated Workshop of LICS 2005.
- [2] A. Almeida Matos, G. Boudol, and I. Castellani. Typing noninterference for reactive programs. *Journal of Logic and Algebraic Programming*, 72(2):124–156, 2007. Special Issue on Programming Language Interference and Dependence.
- [3] P. Baltazar, P. Mateus, R. Nagarajan, and N. Papanikolaou. Exogenous probabilistic computation tree logic. *Electronic Notes in Theoretical Computer Science*, 190(3):95–110, 2007.
- [4] P. Barcia, M. N. Bugalho, M. L. Campagnolo, and J. O. Cerdeira. Using N-alkanes to estimate diet composition of herbivores: a novel mathematical approach. *Animal*, 1:141–149, 2007.
- [5] O. Bournez, M. L. Campagnolo, D. S. Graça, and E. Hainry. Polynomial differential equations compute all real computable functions on computable compact intervals. *Journal of Complexity*, 23:317–335, 2007.
- [6] C. Caleiro and J. Ramos. From fibring to cryptofibring: a solution to the collapsing problem. *Logica Universalis*, 1(1):71–92, 2007.
- [7] M. L. Campagnolo and K. Ojakian. The methods of approximation and lifting in real computation. *Electronic Notes in Theoretical Computer Science*, 167:387–423, 2007. Preliminary version presented at the Third International Conference on Computability and Complexity.
- [8] J. Cederquist, R. J. Corin, M. A. C. Dekker, S. Etalle, J. I. den Hartog, and G. Lenzini. Audit-based compliance control. *International Journal of Information Security*, 6(2-3):133–151, 2007.
- [9] R. Chadha, L. Cruz-Filipe, P. Mateus, and A. Sernadas. Reasoning about probabilistic sequential programs. *Theoretical Computer Science*, 379(1-2):142–165, 2007.
- [10] F. Ciccarello, M. Palma, M. Zarcone, Y. Omar, and V. Rocha Vieira. Static disorder in a 1d wire with two quantum scattering centers. *Laser Physics*, 17(6):889–892, 2007.
- [11] C. Lourenço. Dynamical computation reservoir emerging within a biological network. *Neurocomputing*, 70:1177–1185, 2007.

- [12] F. Moura. Type II and heterotic one loop string effective actions in four dimensions. *Journal of High Energy Physics*, 06:052, 2007.
- [13] F. Moura and R. Schiappa. Higher-derivative corrected black holes: Perturbative stability and absorption cross-section in heterotic string theory. *Classical and Quantum Gravity*, 24(2):361–386, 2007.
- [14] J. Rasga. Sufficient conditions for cut elimination with complexity analysis. *Annals of Pure and Applied Logic*, 149(1-3):81–99, 2007.
- [15] M. Rocheta, F. M. Dionísio, L. Fonseca, and A. M. Pires. Paternity analysis in excel. *Computer Methods and Programs in Biomedicine*, 88(3):234–238, 2007.

1.2 Book chapters

- [16] C. Caleiro and R. Gonçalves. On the algebraization of many-sorted logics. In J. Fiadeiro and P.-Y. Schobbens, editors, *Recent Trends in Algebraic Development Techniques - Selected Papers*, volume 4409 of *Lecture Notes in Computer Science*, pages 21–36. Springer-Verlag, 2007.
- [17] W. A. Carnielli, M. E. Coniglio, and J. Marcos. Logics of formal inconsistency. In D. Gabbay and F. Guenther, editors, *Handbook of Philosophical Logic*, volume 14. Kluwer Academic Publishers, 2nd edition, 2007.
- [18] C. Lourenço. How can natural brains help us compute? In S.B. Cooper, B. Löwe, and A. Sorbi, editors, *Computation and Logic in the Real World*, Quaderni del Dipartimento di Scienze Matematiche e Informatiche "Roberto Magari", pages 257–262. Università di Siena, 2007.
- [19] Y. Omar, N. Paunkovic, and V. R. Vieira. Macroscopic thermal entanglement. In J. M. P. Carmelo, J. M. B. Lopes dos Santos, V. R. Vieira, and P. D. Sacramento, editors, *Strongly Correlated Systems, Coherence and Entanglement*, pages 567–595. World Scientific, 2007.
- [20] A. Sernadas, P. Mateus, and Y. Omar. Quantum computation and information. In M. S. Pereira, editor, *A Portrait of State-of-the-Art Research at the Technical University of Lisbon*, pages 46–65. Springer-Verlag, 2007.

1.3 Conference papers

- [21] P. Baltazar, R. Chadha, P. Mateus, and A. Sernadas. Towards model-checking quantum security protocols. In P. Dini et al, editor, *Proceedings of the First Workshop on Quantum Security: QSec'07*, page 0014. IEEE Press, 2007. Joint e-proceedings with Quantum, Nano, and Micro Technologies: ICQNM '07. 6 pages.

- [22] M. L. Campagnolo and J. O. Cerdeira. Contextual classification of remotely sensed images with integer linear programming. In *Proceedings of CompIMAGE - Computational Modelling of Objects Represented in Images: Fundamentals, Methods and Applications*, pages 123–128. Taylor and Francis, 2007.
- [23] J. Cederquist, M. Torabi Dashti, and S. Mauw. A certified email protocol using key chains. In *Proceedings of the 21st International conference on Advanced Information networking and Applications Workshops/Symposia (AINA'07)*, pages 525–530. IEEE CS press, 2007.
- [24] M. A. C. Decker, J. Cederquist, J. Crampton, and S. Etalle. Extended privilege inheritance in rbac. In R. H. Deng and P. Samarati, editors, *Proceedings the 2007 ACM Symposium on Information, Computer and Communications Security*, pages 383–385, New York, NY, USA, 2007. ACM Press. Short paper.
- [25] I. Lanese, V. Vasconcelos, F. Martins, and A. Ravara. Disciplining orchestration and conversation in service-oriented computing. In *5th IEEE International Conference on Software Engineering and Formal Methods*, pages 305–314. IEEE, 2007.
- [26] C. Lourenço. Structured reservoir computing with spatiotemporal chaotic attractors. In M. Verleysen, editor, *Proceedings the 15th European Symposium on Artificial Neural Networks (ESANN 2007)*, pages 501–506, 2007.
- [27] P. Mateus, F. Moura, and J. Rasga. Transferring proofs of zero-knowledge systems with quantum correlations. In P. Dini et al, editor, *Proceedings of the First Workshop on Quantum Security: QSec'07*, page 0009. IEEE Press, 2007. Joint e-proceedings with Quantum, Nano, and Micro Technologies: ICQNM '07. 6 pages.

1.4 PhD thesis

- [28] D. S. Graça. *Computability with Polynomial Differential Equations*. PhD thesis, IST, Universidade Técnica de Lisboa, 2007. Supervised by M. Campagnolo and J. Buescu.

2 Research project coordination

- QuantLog: Logic in Quantum Computation and Information – FCT Project FEDER POCI/MAT/55796/2004
 - A. Sernadas
- Space-Time-Types: Behavioural and Spatial Type Systems FCT Project FEDER POSC/EIA/55582/2004
 - A. Ravara

- KLog: Kleistic Logic – FCT and EU FEDER PTDC/MAT/68723/2006
 - C. Caleiro
- QSec: Quantum Security – FCT and EU FEDER PTDC/EIA/67661/2006
 - P. Mateus

3 Organization of events

- The 18th International Conference on Concurrency Theory (CONCUR'07), FCG and IST, Lisboa, September 3-8, 2007.
 - A. Ravara: Workshop organization chair.
- Lisbon Quantum Computation, Information and Logic (LQCIL'07), IST, Lisboa, July 18-20, 2007.
 - P. Ado: Co-organizer.
 - P. Mateus: Organization chair.
 - Y. Omar: Co-organizer.
 - A. Sernadas: Program chair.
- TheNIS 2nd Information Security Workshop, IST, Lisboa, July 17, 2007.
 - P. Ado: Co-organizer.
 - P. Mateus: Organization chair.
 - C. Caleiro: Co-organizer.
- Tarde de Trabalho SPM/CIM em Lgica e Computao, CIM, Coimbra, May 5, 2007.
 - C. Sernadas: Organizer.
 - P. Mateus: Moderator.

4 Research Lectures and Seminars

- Formal Analysis, Theory and Algorithms Seminar, Department of Computing Science, University of Glasgow, UK, December 18, 2007.
 - A. Ravara: Behavioural Types for Object-Oriented Languages.
- Workshop-Escola de Computao e Informao Quntica, Campina Grande, Brazil, October 29-31, 2007.

- P. Mateus [invited talk]: Logic foundations of quantum security.
- International Workshop on First-Order Theorem Proving (FTP 2007), Liverpool, UK, September 12-13, 2007.
 - J. Ramos: Labeled tableaux for distributed temporal logic
- 6th International Symposium on Frontiers of Combining Systems (FroCoS 2007), Liverpool, UK, September 10-12, 2007.
 - J. Ramos: Combining Classical and Intuitionistic Implications
- XVI International Fall Workshop on Geometry and Physics, IST, Lisboa, Portugal, September 5-8, 2007.
 - F. Moura: Type II and heterotic one loop effective actions.
- 2nd World Congress on Universal Logic, Xian, China, August 20-22, 2007.
 - R. Goncalves: On the algebraization of global and probabilistic exogenous logics.
- Meeting on Algebraic and Topological Methods in Non-Classical Logics III, Oxford, UK, August 5-9, 2007.
 - R. Goncalves: Behavioral algebraization.
- Lisbon Quantum Computation, Information and Logic (LQCIL'07), IST, Lisboa, Portugal, July 18-20, 2007.
 - N. Paunkovic: Fair contract signing with decoherence.
 - J. Rasga: Transferring proofs of zero-knowledge systems with quantum tamper-proof devices.
- 20th IEEE Computer Security Foundations Symposium (CSF 2007 - Rump Session), Venice, Italy, July 6-8, 2007.
 - P. Ado: A calculus for high-level cryptography and its computational implementation.
- LASEC Seminar, EPFL, Lausanne, Switzerland, June 19, 2007.
 - P. Mateus: Introduction to quantum security.
- Computation and Logic in the Real World, CiE 2007, Siena, Italy, June 18-23, 2007.
 - C. Loureno: How can natural brains help us compute?
- School on Attractor Mechanism, INFN, Frascati, Italy, June 18-22, 2007.

- F. Moura: Type II and heterotic one loop effective actions.
- 4th Conference on Computability and Complexity in Analysis (CCA 2007), Siena, Italy, June 16-18, 2007.
 - D. S. Graa: Boundedness of the domain of definition is undecidable for polynomial ODEs.
- International Conference on Order, Algebra, and Logics, Nashville, USA, June 12-16, 2007.
 - R. Goncalves: Behavioral algebraization.
- 26th Weak Arithmetics Days (JAF 26), Seville, Spain, June 11-13, 2007.
 - D. S. Graa: Computability problems for differential equations.
- Security Seminar, INRIA-Microsoft Paris joint Research Lab, France, May 25 2007.
 - A. Almeida Matos: Non-disclosure for distributed mobile code.
- 21st International conference on Advanced Information networking and Applications Workshops/Symposia (AINA'07), Niagara Fall, Canada, May 22, 2007.
 - J. Cederquist: A certified email protocol using key chains.
- 15th European Symposium on Artificial Neural Networks (ESANN 2007), Bruges, Belgium, April 25-27, 2007.
 - C. Loureno: Structured reservoir computing with spatiotemporal chaotic attractors.
- Tarde de Trabalho SPM/CIM em Lgica e Computao, CIM, Coimbra, Portugal, May 5, 2007.
 - D. S. Graa: Problemas de computabilidade em equaes diferenciais.
- Simpsio Doutoral do Departamento de Informtica, Univiversidade do Minho, Braga, Portugal, February 23, 2007.
 - P. Ado: Mtodos formais em segurana.
 - C. Caleiro: Anlise de protocolos de segurana.
 - P. Mateus: Segurana quntica.
- Seminrios do Centro de Informtica e Tecnologias da Informao, FCT/UNL, Lisboa, Portugal, February 21, 2007.
 - C. Caleiro: Distributed temporal logic for security protocol analysis

- First International Workshop on Quantum Security, Guadeloupe, France, January 2-6, 2007.
 - P. Mateus: Transferring proofs of zero-knowledge systems with quantum correlations.
 - P. Mateus: Towards model-checking quantum security protocols.

Other Research Units
2007

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1 Publications in 2007

1.1 Books (authored or edited)

A.B. Cruzeiro,

- H. Ouerdiane and N. Obata. *Mathematical Analysis of Random Phenome* (Proceedings of the International Conference, Hammamet, Tunisia, 12-17 September 2005), World Scientific, 2007.

M. F. Ramalhoto,

- and E. Elsayed Guest Editors of the Special Issue on New and emerging trends in reliability (Part I-Methodology) of (the international Journal of) *Quality Technology and Quantitative Management*, Vol. 4, No.1, pp.1-155, March 2007.
- and E. Elsayed Guest Editors of the Special Issue on New and emerging trends in reliability (Part II-Frameworks) of (the international Journal of) *Quality Technology and Quantitative Management*, Vol. 4, No.2, pp.157-312, June 2007.

1.2 Chapters/articles in books with international refereeing

M.F. Ramalhoto,

- *Stochastics for the quality movement: An integrated approach to reliability and safety*, in *Statistical Practice in Business and Industry*, S.Y.Coleman, T.Greenfield, D.J.Stewardson and D. Montgomery (Eds), Wiley, 2007, pp.1-427.

1.3 Articles in international serials

J. Félix Costa,

- and Daniel Pacheco, *The abstract immune system algorithm*, in S. G. Akl, C. S. Calude, M. J. Dinneen, G. Rozenberg, and H. T. Wareham (eds.), *Proceedings of the 6th Intl. Unconventional Computation 2007*, *Lecture Notes in Computer Science 4618*, Springer, 2007, 137-149.
- Bruno Loff and Jerzy Mycka, *The new promise of analog computation*, invited paper, in S. Barry Cooper, Benedikt Löwe, and Andrea Sorbi (eds.), *Third Conference on Computability in Europe, CiE2007*, Siena, Italy, June 18-23, 2007, *Computation and Logic in the Real World*, *Lecture Notes in Computer Science 4497*: 189-195, Springer, 2007.

1.4 Articles in international journals

J. Félix Costa,

- and Bruno Loff, *Five views of hypercomputation*, *International Journal of Unconventional Computing*, Special Issue *Hypercomputation*, 5(1), Old City Publishing, 2008, in print.
- Jerzy Mycka, and Francisco Coelho, *The Euclid abstract machine*, *International Journal of Unconventional Computing*, Special Issue *Towards a Theory of Unconventional Computing*, 4(3): 223-248, Old City Publishing, 2007.
- Bruno Loff and Jerzy Mycka, *Computability on reals, infinite limits and differential equations*, *Applied Mathematics and Computation*, 191(2):353–371, Elsevier, 2007.
- and Jerzy Mycka, *A new conceptual framework for analog computation*, *Theoretical Computer Science*, 374(1-3):277–290, Elsevier, 2007.

A.B. Cruzeiro,

- and F. Flandoli and P. Malliavin. Brownian motion on volume preserving diffeomorphisms group and existence of global solutions of 2D stochastic Euler equation. *J. Funct. Anal.* 242 (1), 304-326, 2007.
- F. Cipriano and A.B. Cruzeiro. Navier-Stokes Equation and Diffusions on the group of Homeomorphisms of the torus. *Comm. Math. Phys.* 275 (2), 255-269, 2007.

M. F. Ramalhoto,

- and R. Goeb and C. McCollin, Ordinal methodology in the analysis of likert scales, (international Scientific Journal) *Quality & Quantity*, 2007.
- and Elsayed, E., New and emerging trends in reliability, Editorial, *Quality Technology and Quantitative Management*, Vol. 4, No.1, pp.1, March 2007.

M. I. Santos

- and A. Porta Nova, Estimating and validating nonlinear regression metamodels in simulation. *Communications in Statistics - Simulation and Computation*, vol. 36, no 1, pp 123-137, 2007.

1.4.1 Articles/communication in proceedings of international conferences

J. Félix Costa,

- and Luís Miguel Gomes, Hybrid finite computation, in S. Barry Cooper, Thomas F. Kent, Benedikt Löwe, and Andrea Sorbi (eds.), *Third Conference on Computability in Europe, CiE2007*, Siena, Italy, June 18-23, 2007, *Computation and Logic in the Real World, Local Proceedings*, Technical report no. 487 June 2007, 178-185.

A.B. Cruzeiro,

- and P. Malliavin. Stochastic evolution of inviscid Burgers fluid. Published in *Probability, Geometry and Integrable Systems*, MSRI Publications, Vol. 55, 2007.
- F. Cipriano and A.B. Cruzeiro. Variational principle for diffusions on the diffeomorphism group with the H^2 metric. Published in *Mathematical Analysis of Random Phenomena*, 85-91, World Sci. Publ., Hackensack, NJ, 2007.

M. F. Ramalhoto,

- and R. Burruano, The stochastics for the quality movement framework and its role in the improvement and innovation of the sea port structure and logistics (abstract), in the XXXVIII Annual conference of the Italian Operations Research Society-Optimization and Decision Sciences, AIR 07, Genova, Italy, 5-8 September, 2007.

M.I. Santos,

- and P. M. Santos, Simulation Metamodels for Modeling Output Distribution Parameters. In *Proceedings of the 40th IEEE International Conference Winter Simulation Conference*, pp 910-918. Conferência patrocinada por ASA, ACM/SIGSIM, IEEE/SMC, INFORMS-SIM, IIE, NIST, SCS. 2007.
- and P. M. Santos, Sequential Designs for Simulation Experiments: Nonlinear Regression Metamodeling. In *Proceedings of the 26th IASTED International Conference Modelling, Identification and Control*, pp 88-93, 2007.

2 Publications accepted or submitted in 2007

J. Félix Costa,

- Edwin Beggs, Bruno Loff, and John Tucker, On the complexity of measurement in classic physics, in M. Agrawal, D. Du, Z. Duan, and A. Li (eds.), *Theory and Applications of Models of Computation*, TAMC 2008, Xi'an, China, April 25-29, 2008, Lecture Notes in Computer Science, 4978, Springer, 2008, 20-30.
- and Hélia Guerra, Processes with local and global liveness requirements, *Journal of Logic and Algebraic Programming*, Elsevier, in print.
- Bruno Loff and Jerzy Mycka, A foundation for real recursive function theory, *Annals of Pure and Applied Logic*, Elsevier, accepted for publication.

A.B. Cruzeiro,

- with F. Flandoli and P. Malliavin, *Brownian motion on volume preserving diffeomorphisms group and existence of global solutions of 2D stochastic Euler equation*, accepted for publication in *J. Funct. Anal.*
- with F. Cipriano, *Diffusions on the group of homeomorphisms of the torus and the Navier Stokes equation*, submitted.
- with F. Cipriano, *Variational principle for diffusions on the diffeomorphism group with the H^2 metric*, submitted.
- with P. Malliavin, *Stochastic evolution of inviscid Burgers fluid*, submitted.
- with C. J. S. Alves, *Monte-Carlo simulation of stochastic differential systems - a geometrical approach*, submitted.

3 Research lectures and Seminars

J. Félix Costa,

- *O Lugar da Imaginação em Ciência*, Workshop Os lugares da Epistemologia e da Poética de Gaston Bachelard, Centro de Filosofia das Ciências da Universidade de Lisboa, December 10, 2007.
- Sixth International Conference on Unconventional Computation (UC'07), Queen's University, Kingston, Ontario, 13-17 August 2007.
- *Computation and Logic in the Real World*, Invited speaker of a Special Session of the European CiE Conference Computability in Europe 2007, University of Siena, Siena, 18-23 June 2007.
- Short presentation on *Gödelian Systems*. Panel Kurt Gödel na Cultura Actual, in Livraria Alameda, June 15, 2007.
- Seminar *Newtonian Cosmology*, Observatório Astronómico de Lisboa, May 25, 2007.
- *As Concepções Clássicas do Universo e os Primeiros Passos da Revolução Científica*, Seminar Club Setubalense, April 12, 2007, sequence of lectures entitled *Fases Evolutivas da História da Ciência*.
- *Onde começa e onde acaba uma Teoria Científica?*, In the Colóquio Darwinismo versus Criação, Centro de Filosofia das Ciências da Universidade de Lisboa at Lisbon, March 21, 2007: *A Criação Segundo o Livro do Génesis (bereshit): Midrash e Estudo Rabínico*.
- In the Workshop Arte e Ciência como Criação: *Em torno de Gaston Bachelard*, January 26, 2007.

R. Coutinho,

- Discontinuous Rotations, presented at Progress on Difference Equations and Applications 2007, Laufen, 1 April 2007.
- Planar fronts in bistable coupled map lattices, presented at the 12th Conference on Difference Equations and Applications, IST, Lisbon, 24 July 2007.

A.B. Cruzeiro,

- Non ergodicity of the Euler flow on the torus and curvature of the diffeomorphisms group. International Conference on Stochastic Analysis and Applications, Hammamet, Tunisia, 8 November 2007.
- Non ergodicity of the Euler flow on the torus. Workshop Applications of Stochastic Partial Differential Equations, Fall Program ³Stochastic P.D.E.'s, Institut Mittag-Leffler, Sweden, 13-17 November 2007.
- Diffusions on the volume preserving diffeomorphisms group and hydrodynamics equations, Mathematical Institute, Oxford University, January 2007.
- The geometry of the diffeomorphisms group on the torus and the Euler flow, Universidade de Coimbra, Portugal, October 2007.

4 Participation in research projects

A. B. Cruzeiro,

- POCTI *Integração Funcional e Aplicações* (POCTI/MAT/55977/2006)
- PTDC/MAT/69635/2006, "Mathematical Physics" (FCT) 2007-2010

M.F. Ramalhoto,

- Founder member with Guedes Soares and Barradas of the research unit of Marine Technology and Engineering <http://www.mar.ist.utl.pt/uetn/>. (In 2008 it will become a Research Center).

5 Organizations of scientific events

5.1 Events which took place in 2007

J. Félix Costa,

- Member of the Scientific Committee of the UC'07 — Sixth International Conference on Unconventional Computation (UC'07), Queens University, Kingston, Ontario, 13-17 August 2007.

A. B. Cruzeiro,

- Probability and Stochastic Analysis Working Afternoons SPM/CIM Coimbra, Portugal, 3 March 2007.
- Member of the Scientific Committee of the *International Conference on Stochastic Analysis and Applications*, Hammamet, Tunisia, November 2007.

M. F. Ramalhoto,

- Member of the international scientific committee of ISBIS 2007 Conference (sponsored by the International Statistics Institute, ISI), Azores, Portugal, August 18-20, 2007.
- Member of the international technical committee of ESREL'07 Safety and Reliability (annual conference of the European Safety and Reliability Association), Stovange, Norway, June 25-27, 2007.

5.2 Events taking place after 2007

M. F. Ramalhoto,

- member of the international scientific committee of the Second International Symposium on Stochastic Models in Reliability, Safety, Security and Logistics, Sami Shamoon College of Engineering (formerly NACE), Beer Sheva, Israel, February 15-18, 2010.

6 Other information

6.1 Editorial boards

J. Félix Costa,

- Coleção Máquina do Mundo, Bizâncio.

A. B. Cruzeiro,

- Member of the Editorial Board of the EMS Newsletter.

M. F. Ramalhoto,

- Associate Editor of the international scientific journal Quality Technology and Quantitative Management (QTQM).
- Associate Editor of the European Journal of Engineering Education (EJEE).

6.2 Scientific management positions

J. Félix Costa,

- Referee for the Natural Sciences and Engineering Research Council of Canada.

A. B. Cruzeiro,

- Member of the Mathematical Physics Committee (C18) of the IUPAP (International Union of Pure and Applied Physics).
- Member for the Committee for meetings of the European Mathematical Society.
- Member of the do E.R.C. (European Research Council) evaluation panels
- Referee for the E.S.F.

M. F. Ramalhoto,

- Founder member and former Vice- President of the European Network for Business and Industrial Statistics (ENBIS), Sheffield, UK.
- Member of the International Advisory Board of Reliability Conferences of the ISI.
- Member of the Seventh Framework Evaluation Panel (Expert-Evaluator) of the European Commission, Brussels, Belgium.

6.3 Personal notes

J. Félix Costa,

- Bruno Serra Loff Barreto, Physics, *Computation and Definability*, Mestrado em Informática, Departamento de Engenharia Informática, Instituto Superior Técnico da Universidade Técnica de Lisboa, Outubro de 2007.

A. B. Cruzeiro,

- Evelina Shamarova (Post-doctoral fellow)
- Ana Dias (Mestrado co-supervisor: J.C. Zambrini)

M. F. Ramalhoto,

- SEFI (Société Européenne pour la Formation des Ingénieurs) Fellow.