



Research Report 1999

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RESEARCH REPORT

1999

Preface

On the ninth year of the publication of this report we recall its original goals set forth on our previous reports:

*The Department of Mathematics regards the annual publication of this research report as an important instrument of scientific policy. 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 72 members holding PhD degrees and is one of the largest mathematics departments in the country and a major mathematics research center. It has its own undergraduate degree in Applied Mathematics and Computer Science and a formal graduate program. All the information regarding the department and its graduate and undergraduate degree programs is presently accessible on the internet page with the address:

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

During 1999, the research activities of the department were subjected to an external international review within the overall Research Units Assessment carried out by the Ministry of Science and Technology. For the second time, the research units related to our department received very high ratings from this board acknowledging the international value of the research conducted.

We intend to pursue our development as a research department and recall from the previous report our own assessment of this evolution:

The department experienced a fast development since it embraced the goal of becoming a research department. The number of members holding a PhD degree and the predominant youth of its faculty is appropriate for the creation and conduction of innovative projects. The number and quality of international activities already announced, is an indication that the department has accepted the challenge of achieving a significant position among the international mathematics research centers.

I would like to thank everyone who was involved in the organization of this issue, especially Professor Gabriel Pires, who coordinated the preparation of the report. I am also grateful to Adelaide Airoso and Ema Silva for her work in word processing this issue.

Lisbon, 7 June 2000

The Department Chairman

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Research Areas

The main areas of research pursued in the Department of Mathematics of IST are:

Dynamical Systems and Differential Equations

The dominant research in this area falls within the general field of mathematical analysis with an emphasis on non-linear 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 non-linear analysis, control theory and mechanics of continuous media. The research is organized along five lines of work: qualitative theory of dynamical systems, geometric mechanics and hamiltonian systems, methods of non-linear analysis in mechanics of continuous media and methods of non-linear systems analysis in control theory, ergodic theory and dynamical systems.

Geometry and Topology

The work in this area is mostly concerned with problems spanning geometry, topology, algebra and analysis, namely questions related to the connection of some classical topics - differential geometry, mathematical physics, dynamical systems, symplectic geometry - with modern developments, including infinite-dimensional and discrete problems, for which Lie groups, K-theory, von Neumann algebras, noncommutative geometry and combinatorics are essential tools.

Operator Theory and Integral Equations

The work in this area is focused on singular integral operators and other related classes of linear operators like Toeplitz, Carleman-shift and pseudo-differential operators. The motivation for the work comes mainly from problems of diffraction theory and other applications leading to elliptic boundary-value problems. These problems are formulated in appropriate Sobolev spaces and treated by operator theory methods. The emphasis is on linear operator theory and Banach algebras and their connections with complex analysis, in particular Hardy spaces. Current problems under investigation include factorization of (semi)-almost periodic matrix-valued symbols, diffraction problems with approximate boundary conditions of arbitrary order, operator relations, normalization problems, and finite section methods for singular equations.

Probability, Statistics and Applications

The research in this general area has focused on queueing theory and quality control, multivariate analysis, stochastic optimization, categorical data analysis and statistical inference. In queueing theory and quality control, interest is concentrated on order relations, transient behaviour, 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 Mathematical Analysis in Fluid Dynamics

The research on numerical methods for differential and integral equations is mainly directed towards: i) convergence acceleration techniques for ordinary differential equations with singularities and also for integral equations with singular kernels; ii) integral equation methods applied to problems in material science (elasticity and effective properties of composite materials); iii) spline collocation methods for Volterra integral equations with singular kernels; iv) boundary integral equations methods in acoustic and elastic scattering and related inverse scattering problems. The research on fluid dynamics is concerned with the questions of existence, uniqueness and asymptotic behaviour of solutions to the equations modeling the flow of incompressible non-newtonian fluids of differential type. Situations such as flows in bounded and exterior domains and flows in domains with unbounded boundaries (channels, pipes, aperture domains) have been studied. The numerical study of the Stokes and Navier-Stokes equations by boundary and finite element methods as well as by domain decomposition methods has also been addressed.

Computer Science

The research work in the area of Computer Science has been focused on the algebraic, categorial and logical foundations of software engineering, with emphasis on system specification and verification. The main lines of research are: (1) combination of logics for heterogeneous approaches to specification; (2) alternatives to the temporal logic approach to the specification and verification of reactive, concurrent systems, such as the situation calculus and observational logic; (3) action and deontic logic for the representation of juridical and organizational knowledge; (4) new logics for specifying and verifying probabilistic and hybrid systems. Typical problems addressed include the categorial characterization of logic structures and translation mechanisms as well as the completeness of specialized calculi. Most of the work has been carried out within the scope of either international cooperation projects, namely the ESPRIT Basic Research Actions ASPIRE and FIREworks, or national projects,

namely the PRAXIS projects, ACL, LogComp, ProbLog, SARA and QUEST.

Other Areas

There are also some individual members of the department working in other areas, such as theory of distributions, mathematical physics, combinatorics, logic and operations research.

Research seminars

During 1999 the Department of Mathematics at IST ran regular sessions of the following seminars:

- Seminar on Analysis, Geometry, and Dynamical Systems, every week.
Organizer: Luis Barreira.
- Seminar on Applied Mathematics and Numerical Analysis, every other week.
Organizer: Adélia Sequeira.
- Seminar on Functional Analysis and Applications, every week.
Organizer: Frank-Olme Speck.
- Seminar on Geometric and Topological Methods in Low Dimension and Infinite Dimensions, every other week.
Organizer: José Sousa Ramos
- Seminar on Mathematical Physics, every other week.
Organizers: Rui Loja Fernandes and Ana Cannas da Silva
- Seminar on Theory of Computing, every week.
Organizer: Amílcar Sernadas.
- TQFT Club, on Geometry, Topology and Quantum Theory, monthly.
Organizer: Roger Picken

The Department also started a Mathematics Colloquium jointly coordinated by Luis Barreira and Frank-Olme Speck with an approximate period of two weeks.

1 Publications

1.1 Publications which appeared in 1999

1.1.1 Books (authored or edited)

Algebra and Mathematical Analysis

Cannas da Silva, A. and Weinstein, A., Geometric models for noncommutative algebras, Berkeley Mathematics Lecture Notes Series, American Mathematical Society, 1999.

Statistics and Applications

Ramalhoto, M. F., Guest-editor, EJEE (European Journal of Engineering Education), Special issue on research and education in reliability, maintenance, quality control, risk and safety, 1999.

Applied Mathematics and Numerical Analysis

Sequeira, A., Beirão da Veiga, H. and Videman, J. H., Eds., Applied nonlinear analysis (in honor of the 70th birthday of Prof. J. Necas), Kluwer Academic/Plenum Publishers, 1999.

Computer Science

Carmo, J., Sernadas, A., Sernadas, C., Dionísio, F.-M. and Caleiro, C., Introduction to programming in mathematica, IST Press, 1999.

Hüttel, H., Kleist, J., Nestmann, U. and Ravara, A., Eds., Proceedings of the Workshop on Semantics of Objects as Processes SOAP'99, volume NS-99-2, BRICS Notes Series, BRICS, (1999), Lisbon, Portugal, June 15, 1999.

1.1.2 Chapters/Articles in Books with international refereeing

Algebra and Mathematical Analysis

Cannas da Silva, A. and Guillemin, V., Quantization of symplectic orbifolds and group actions, Northern California Symplectic Geometry Seminar, (Eliashberg, Y. et al., Eds.), American Mathematical Society Translations, **196**, (1999), 1-12.

Statistics and Applications

Ramalhoto, M. F., Stochastic modelling for quality improvement in processes (chapter 26 in the book Statistical Process Monitoring and Optimization), (Sung, H. Park and G. Geoffrey Vining, Eds.), Marcel Dekker, (1999), 435-456.

Ramalhoto, M. F., A way of addressing some of the new challenges of quality management, (Schueller, G.I. and Kalfka, P., Eds.), *Safety and Reliability*, Balkema, **2**, (1999), 1077-1082.

Ramalhoto, M. F., Some recent developments in control charts for the non-Gaussian quality characteristics, (Schueller, G.I. and Kalfka, P. Eds.), *Safety and Reliability*, Balkema, **2**, (1999), 1553-1558.

1.1.3 Articles in International Journals and Serials

Algebra and Mathematical Analysis

Alves, J. and Sousa Ramos, J., Kneading theory: A functorial approach, *Commun. Math. Phys.*, **204**, (1999), 89-114.

Barreira, L., Pesin, Ya. and Schmeling, J., Dimension and product structure of hyperbolic measures, *Annals of Mathematics*, **149**, (1999), 755-783.

Caetano, A. P. and Picken, R. F., On a family of topological invariants similar to homotopy groups, *Rendiconti Univ. di Trieste*, **30**, (1999), 81-90.

Câmara, M. C., and Santos, A. F., Wiener-Hopf factorization of a generalized Daniele - Khrapkov class of 2×2 matrix symbols, *Math. Appl. Sci.*, **22**, (6), (1999), 461-484.

Castro, H. M. A. and Oliva, W. M., Anosov flows induced by partially hyperbolic Σ - geodesic flows, *Resenhas IME-USP*, **4**, (2), (1999), 227-246.

Roberts, R. M. and Sousa Dias, M. E., Symmetries of Riemann Ellipsoids, *Resenhas IME-USP*, **4**, (2), (1999) 183-221.

Duarte, P. M., Abundance of elliptic isles at conservative bifurcations, *Dynamics and Stability of Systems*, **14**, (4), (1999), 339-356.

Fiedler, B. and Rocha, C., Realization of meander permutations by boundary value problems, *Journal of Differential Equations*, **156**, (1999), 282-308.

Freitas, P. and Lancaster, P., On the optimal value of the spectral abscissa for a system of linear oscillators, *SIAM J. Matrix Anal. Appl.*, **21**, (1), (1999), 195-208.

Freitas, P., Optimizing the rate of decay of solutions of the wave equation using genetic algorithms: a counterexample to the constant damping conjecture, *SIAM J. Control Optimization*, **39**, (1999), 376-387.

Freitas, P., Quadratic matrix polynomials with Hamiltonian spectrum and oscillatory damped systems, *Z. Angew. Math. Phys.*, **50**, (1999), 64-81.

Freitas, P., Spectral sequences for quadratic pencils and the inverse spectral problem for the damped wave equation, *J. Math. Pures Appl.*, **78**, (1999), 965-980.

Lampreia, J. P., Severino, R. and Sousa Ramos, J., Renormalizations for cubic maps, *Annales Mathematicae Silesianae*, **13**, (1999), 193-204.

Matos, J. P., On gradient Young measures supported on a point and a well, *Adv. Math. Sci. Appl.*, **9**, (2), (1999), 707-716.

Nunes, J. P., Jevicki, A. and Mihailescu, M., Large N field theory of N=2 strings and self-dual gravity, *Chaos, Solitons and Fractals*, **10**, (1999), 385-397.

Penzel, F. and Teixeira, F. S., The Helmholtz equation in a quadrant with Robin's conditions, *Math. Methods Appl. Sci.*, **22**, (3), (1999), 201-216.

Pires, G., Ishii, H. and Souganidis, P. E., Threshold dynamics type approximation schemes for propagating fronts, *J. Math. Soc. Japan*, **51**, (2), (1999), 267-308.

Silva, L., and Ramos, J. Sousa., Two-parameter families of discontinuous unidimensional maps, *Annals Mathematicae Silesianae*, **13**, (1999), 257-270.

Statistics and Applications

Amaral, J. A., Rosário, M. B. and Paixão, M. T., Data and projections of HIV and AIDS in Portugal, *Journal of Applied Statistics*, **27**, (3), (1999).

Paulino, C. D. M. and Silva, G. L., On the maximum likelihood analysis of the general linear model in categorical data, *Computational Statistical and Data Analysis*, **30**, (2), (1999), 197-204.

Ramalhoto, M. F. and Christer, T., European round table on maintenance management, research and development, a report, *European Journal of Engineering Education*, **24**, (4), (Part II), (1999), 441-444.

Ramalhoto, M. F. and Gomez-Corral, A., The stationary distribution of a Markovian process arising in the theory of multiserver retrial queueing systems, *Mathematical and Computer Modelling Journal*, **30**, (1999), 141-158.

Ramalhoto, M. F. and Morais, M., Shewhart control charts for the scale parameter of a Weibull control variable with fixed and variable sampling intervals, *Journal of Applied Statistics*, **26**, (1), (1999), 129-160.

Ramalhoto, M. F., The infinite server queue and heuristic approximations to the multiserver with and without retrials, *TOP*, **7**, (1999), 441-444.

Ramalhoto, M. F., Extended editorial: Research and education in reliability, maintenance, quality control, risk and safety, *European Journal of Engineering Education*, **24**, (3), (Part I), (1999), 243-248.

Ramalhoto, M. F., The research and education global network in stochastics for the quality movement, *European Journal of Engineering Education*, **24**, (4), (Parte II), (1999), 405-413.

Applied Mathematics and Numerical Analysis

Alves, C. J. S., Numerical simulations on resonance poles - The trapping case of two plane cracks, *J. Comp. Appl. Math.*, **111**, (1999), 267-279.

Alves, C. J. S. and Ha Duong, T., Inverse scattering for elastic plane cracks, *Inverse Problems*, **15**, (1999), 91-97.

Brinca, A. L., Motschmann, U. and Romeiras, F. J., On the dispersion of two coexisting nongyrotropic ion species, *Annales Geophysicae*, **17**, (1999), 1134-1144.

Lima, P. M. and Carpentier, M. P. J., Asymptotic expansions and numerical approximation of non-linear degenerate boundary-value problems, *Applied Numerical Mathematics*, **30**, (1999), 93-111.

Lima, P. M. and Carpentier, M. P. J., Iterative methods for a singular boundary-value problem, *J. Comp. Appl. Math.*, **111**, (1999), 173-186.

Matusu-Necasova, S., Sequeira, A. and Videman, J. H., Existence of classical solutions for compressible viscoelastic fluids of Oldroyd type past an obstacle, *Math. Meth. Appl. Sci.*, **22**, (1999), 449-460.

Novotny, A., Sequeira, A. and Videman, J. H., Steady flows of viscoelastic fluids in 3D exterior domains - Existence, uniqueness and asymptotic behaviour, *Arch. Rational Mech. Analysis*, **149**, (1999), 49-67.

Romeiras, F. J. and Brinca, A. L., On the stability of perpendicular electrostatic nodes in stationary nongyrotropic plasmas, *Journal of Geophysical Research*, **104**, (1999), 12407-12414.

Sequeira, A. and Baía, M., A finite element approximation for the steady solution of a second-grade fluid model, *J. Comp. Appl. Math.*, **111**, (1999), 281-295.

Computer Science

Caleiro, C., Sernadas, C. and Sernadas, A., Parameterisation of logics, in recent developments in algebraic development techniques, Selected Papers, (Fiadeiro, J.-L., Ed), Lecture Notes in Computer Science, Springer-Verlag, **1589**, (1999), 48-62.

Mateus, P., Sernadas, A. and Sernadas, C., Precategories for combining probabilistic automata, *Electronic Notes in Theoretical Computer Science*, **29**, (1999).

Ramos, J. and Sernadas, A., The situation and state calculus versus branching temporal logic, in recent developments in algebraic development techniques, Selected Papers, (Fiadeiro, J.-L., Ed), Lecture Notes in Computer Science, Springer-Verlag, **1589**, (1999), 293-309.

Resende, P., Modular specification of concurrent systems with observational logic, in recent developments in algebraic development techniques, Selected Papers, (Fiadeiro, J.-L., Ed), Lecture Notes in Computer Science, Springer-Verlag, **1589**, (1999), 310-325.

Sernadas, A., Sernadas, C. and Caleiro, C., Fibring of logics as a categorial construction, *Journal of Logic and Computation*, **9**, (2), (1999), 149-179.

Vasconcelos, V. and Ravara, A., Communication errors in the pi-calculus are undecidable, *Information Processing Letters*, **71**, (1999), 229-233.

1.1.4 Articles in Proceedings of International Conferences

Algebra and Mathematical Analysis

Correia, J. M. C., and Le Floch, P. G., Nonlinear hyperbolic conservation laws; Nonlinear evolution equations and their applications, (Li, Ta-t sien, Lin, Long-wei and Rodrigues, J. F., Eds.) *World Scientific*, (1999), 21-44.

da Costa, F. P., Convergence to equilibria of solutions to the coagulation-fragmentation equations, in: Nonlinear Evolution Equations and Their Applications, (Ta-t sien Li, Long-wei Lin and Rodrigues, J. F., Eds.), *World Scientific*, Singapore, (1999), 45-56.

Fernandes, R. L., Contravariant connections on Poisson manifolds, Proceedings of the Summer School on Differential Geometry, (Wegner, B., Ed.), CIM, Coimbra, (1999), 99-108.

Freitas, P., Nonlocal reaction-diffusion equations, Differential Equations with Applications to Biology (Halifax, NS, 1997), American Mathematical Society, (1999), 187-204.

Grácio, C. and Sousa Ramos, J., Symbolic dynamics and hyperbolic groups, Proceedings of the ECIT '96, *Grazer Mathematische Berichte*, **339**, (1999), 195-206.

Lampreia, J. P., Severino, R. and Sousa Ramos, J., Renormalizations for trimodal maps, *Fields Institute Communications*, **21**, (1999), 353-362.

Martins, P. and Sousa Ramos, J., Topological and geometrical properties of isentropic torus automorphisms, Proceedings of the ECIT '96, *Grazer Mathematische Berichte*, **339**, (1999), 251-260.

Silva, L. and Sousa Ramos, J., Renormalization of Newton maps, Proceedings of the ECIT '96, *Grazer Mathematische Berichte*, **339**, (1999), 313-328.

Sousa Dias, M. E., Relative equilibria in linear elasticity, International workshop on Symmetry and Perturbation Theory, SPT 98, (Degasperis, A. and Gaeta, G., Eds), *World Scientific*, (1999), 258-267

Statistics and Applications

Nunes, C. and Pacheco, A., Stability for input-output systems, Proceedings of ASMDA99- Applied Stochastic Models and Data Analysis: Quantitative Methods in Business and Industry Society, (Bacelar-Nicolau, H., Costa Nicolau, F. and Jassen, J., Eds.), Instituto Nacional de Estatística, (1999), 410-415.

Ramalhoto, M. F., A framework for quality improvement of queueing systems of the service industry, Invited paper to the session Quality and Reability Improvement of the 52nd International Statistical Institute, *Bulletin of the ISI*, Invited Papers, **2**, (1999), 387-390.

Applied Mathematics and Numerical Analysis

Alves, C. J. S. and Ribeiro, P. M. C., Crack detection using spherical incident waves and near field measurements, in Boundary Elements XXI, (Brebbia, C. A. and Power, H., Eds.), *WIT Press*, Southampton, (1999), 355-364 .

Carpentier, M. P. J., and Lima, P. M., Numerical solution of a sublinear singular boundary-value problem, in EPMESC VII International Conference on Enhancement and Promotion of Computational Methods in Engineering and Science, (Bento, J., Oliveira, E. A. and Pereira, E., Eds.) , *Elsevier*, (1999), 119-129.

Matusu-Necasova, S., Sequeira, A., and Videman, J., Steady motions of compressible viscoelastic fluids of Maxwell type in an exterior domain, (Sequeira, A., Beirão da Veiga, H. and Videman, J. Eds.), *Applied Nonlinear Analysis*, (in honor of the 70th birthday of Professor J. Necas), Kluwer Academic/Plenum Publishers, (1999), 373-390.

Computer Science

Pinto, J., Sernadas, A., Sernadas, C. and Mateus, P., Non-determinism and uncertainty in the situation calculus, Proceedings of FLAIRS'99 - the 12th International Florida AI Research Symposium, (A. Kumar and I. Russell, Eds.), *AAAI Press*, (1999), 454-460.

1.1.5 Other Publications

Statistics and Applications

Amado, M. C. and Pires, A. M., A utilização da função de influência para melhorar o desempenho do método de reamostragem, (Paulino, C. D., Pacheco, A., Pires, A. and Ferreira da Cunha, Eds.), *Afirmar a Estatística: Um Desafio para o Século XXI, Edições SPE*, (1999), 91-99.

Paulino, C. D., Pacheco, A., Pires, A. and Ferreira da Cunha, Eds., *Afirmar a Estatística: Um desafio para o século XXI, Edições SPE*, Lisboa, (1999).

Amaral-Turkman, A. and Paulino, C. D., Bayesians in Portugal, The International Society for Bayesian Analysis, *Newsletter*, 6, 4, (1999).

Branco, J. A., Estatísticos em congresso. Entrevista ao Jornal Expresso, 23.10.99.

Morais, M. C. and Pacheco, A., Comparação estocástica de tempos de primeira passagem: uma aplicação a controlo de qualidade, fiabilidade e filas de espera, (Paulino, C. D., Pacheco, A., Pires, A. and Ferreira da Cunha, Eds.), *Afirmar a Estatística: Um Desafio para o Século XXI, Edições SPE*, (1999), 303-314.

Morais, M. C. and Pacheco, A., Counted data control charts sensitive to sudden increases of the summary statistic, *Revista de Estatística*, 1/99, (1999), 25-45.

Nunes, C. and Pacheco, A., Parameter estimation in MMPP's, (Paulino, C. D., Pacheco, A., Pires, A. and Ferreira da Cunha, Eds.), *Afirmar a Estatística: Um Desafio para o Século XXI, Edições SPE*, (1999), 327-340.

Oliveira, M. R. and Branco J. A., Análise dos efeitos do treino em jovens futebolistas, (Paulino, C. D., Pacheco, A., Pires, A. and Ferreira da Cunha, Eds.), *Afirmar a Estatística: Um Desafio para o Século XXI, Edições SPE*, (1999), 91-99.

Paulino, C. D., Turkman, A., Murteira, B. and Faria, J., *Notas de Estatística Bayesiana*, FCUL, Lisboa, 1999.

Santos, C. and Pires, A. M., Algumas questões em aberto na análise discriminante para três grupos, (Paulino, C. D., Pacheco, A., Pires, A. and Ferreira da Cunha, Eds.), *Afirmar a Estatística: Um Desafio para o Século XXI, Edições SPE*, (1999), 361-366.

Silva, G. L. and Amaral-Turkman, M. A., Modelos de sobrevivência com fragilidade: Uma introdução, *Notas e Comunicações*, **14**, (1999).

Silva, G. L. and Amaral-Turkman, M. A., Uma aplicação dos modelos de fragilidade aditivos bayesianos, (Paulino, C. D., Pacheco, A., Pires, A. and Ferreira da Cunha, Eds.), *Afirmar a Estatística: Um Desafio para o Século XXI, Edições SPE*, (1999), 375-378.

Applied Mathematics and Numerical Analysis

Graça, M., Sobre o anti-limite de uma sucessão divergente de vectores, *Boletim da SPM*, **40**, (1999), 69-74.

Computer Science

Nestmann, U. and Ravara, A., Semantics of objects as processes (SOAP), ECOOP Workshop Reader, (Moreira, A. and Demeyer, S., Eds), An introduction to, and summary of, the 2nd International SOAP Workshop, Lecture Notes in Computer Science, Springer-Verlag, **1743**, (1999), 314-325.

Hüttel, H., Kleist, J., Nestmann, U. and Ravara, A., Eds., Proceedings of the Workshop on Semantics of Objects as Processes SOAP'99, BRICS Notes Series, *BRICS*, **NS-99-2**, (1999), Lisbon, Portugal, 115.06.99.

1.2 Publications submitted in 1999

Algebra and Mathematical Analysis

Abreu, M. and Freitas, P., On the invariant spectrum of S^1 - invariant metrics on S^2 , Preprint 28/99.

Abreu, M. and McDuff, D., Topology of symplectomorphism groups of rational surfaces, to appear in *Journal of the American Mathematical Society*, Preprint 29/99.

Barreira, L. and Saussol, B., Multifractal analysis of hyperbolic flows, to appear in *Communications in Mathematical Physics*, Preprint 27/99.

Barreira, L. and Saussol, B., Mixed multifractal spectra, Preprint 34/99.

Bastos, M. A., Karlovich, Yu. and dos Santos, A. F., Oscillatory Riemann-Hilbert problems and the Corona theorem, Preprint 1/99.

Bastos, M. A., Karlovich, Yu. and dos Santos, A. F., The invertibility of convolution type operators on a union of intervals and the Corona theorem, Preprint 37/99.

Câmara, M. C. and dos Santos, A. F., Wiener - Hopf factorization for a class of oscillatory symbols, to appear in *Integral Equations and Operator Theory*.

Câmara, M. C., and Malheiro, M. T., Wiener - Hopf factorization for a group of exponentials of nilpotent matrices, Preprint 39/99.

Castro, H. M. A., Kobayashi, M. H. and Oliva, W. M., Partially hyperbolic Σ - geodesic flows, to appear in *Journal of Differential Equations*.

Castro, L. and Speck, F.-O., Relations between convolution type operators on intervals and on the half-line, to appear in *Integral Equations and Operator Theory*.

Castro, L. and Speck, F.-O., An operator approach to a boundary value problem for the Helmholtz equation, to appear in Proceedings of the 17th Conference on Operator Theory.

Doering, L. R., and Pinto, M. V., On the monotonicity of the Hilbert function of the Sally module, to appear in *Communications in Algebra*.

Duarte, P. M., Abundance elliptic isles at conservative bifurcations, to appear in *Dynamics and Stability of Systems*.

Fernandes, R. L., Connections in Poisson geometry I: Holonomy and invariants, Preprint DG/0001129.

Ferreira, J. M., Oscillation and nonoscillations in retarded equations, to appear in *Portugalia Mathematicae*.

Ferreira, J. M. and Pedro, M. P., Spectral bounds and oscillations of a differential-difference system of neutral type, to appear in *Journal of Differential Equations*.

Ferreira, J. M., and Pedro, A. M., Oscillation of differential-difference systems of neutral type, to appear in *Journal of Mathematical Analysis and Applications*.

Fichmann, L. and Oliva, W. M., Collision of global orbits in \mathbb{C} retarded functional differential equations.

Fichmann, L. and Oliva, W. M., One-to-oneness and hyperbolicity.

Freitas, P. and Rocha, C., Lyapunov functionals and stability for FitzHugh-Nagumo systems, to appear in *Journal Differential Equations*, Preprint 15/99.

Freitas, P., Delay-induced instabilities in gyroscopic systems, to appear in *SIAM Journal Control Optimization*, Preprint 18/99.

Fusco, G. and Oliva, W. M., Formation of symmetric structures on the dynamics of repelling particles, to appear in *ARMA*.

Kravchenko, V. G., Lebre, A. B., and Litvinchuk, G. S., Spectrum problems for singular integral operators with Carleman shift, to appear in *Math. Nachr.*

Kravchenko, V. G., Lebre, A. B., and Rodríguez, J. S., Factorization of singular integral operators with a Carleman shift and spectral problems, Preprint 44/99.

Kupka, I. and Oliva, W. M., The non-holonomic mechanics.

Lampreia, J. P., Severino, R. and Sousa Ramos, J., Star-product for cubic maps, Equadiff'99.

Lopes, P. A. and dos Santos, A. F., New results on the invertibility of the finite interval convolution operator, to appear in *Integral Equations and Operator Theory*, Preprint 42/99.

Nelson, J. E. and Picken, R. F., Quantum holonomies in (2+1)-dimensional gravity, to appear in *Phys. Lett.*, B471, (2000), 367-372, Preprint 30/99.

Nelson, J. E. and Picken, R. F., Quantum matrix pairs, to appear in *Lett. Math. Phys.*, Preprint 31/99.

Picken, R. F. and Semião, P. A., TQFT - a new direction in algebraic topology, to appear in the proceedings of the meeting "New Developments in Algebraic Topology", Faro, Portugal, July 1998, Preprint 36/99.

Pinto, J. T. , Slow motion manifolds far from the attractor in multistable reaction-diffusion equations, to appear in *Journal of Differential Equations*, Preprint 25/99.

Oliva, W. M., Santos, J. S. and Taboas, P. Z., A set of global bounded solutions for a Volterra system of retarded equations on \mathbb{R}_+^3 , to appear in *NODEA*.

Santos, P. A., Spline approximation methods with uniform meshes in algebras of multiplication and convolution operators, to appear in *Math. Nachr.*, Preprint 21/99.

Santos, P. A. and Silbermann, B., Galerkin method for Wiener-Hopf operators with piecewise continuous symbol, to appear in *Integral Equations and Operator Theory*.

Statistics and Applications

Amado, C. A. and Pires, A. M., Robust bootstrapping using influence functions, to appear in COMPSTAT 2000: Short Communications in Computational Statistics.

Antunes, N., Pacheco, A. and Rocha, R., Traffic modeling for broadband wireless networks: the highway scenario, to appear in *Advances in Performance Analysis*.

Branco, J. A. and Souto de Miranda, M. M., The tuning constant problem in regression type models, to appear in Actas de "the 6th Tartu Conference on Multivariate Analysis".

Morais, M. C. and Pacheco, A., Misleading signals in joint schemes for μ and σ , to appear in Actas do VII Congresso Anual da SPE, Ofir, Portugal.

Morais, M. C. and Pacheco, A., On the performance of combined EWMA schemes for μ and σ , a Markovian approach, to appear in *Communications in Statistics (Simulation and Computation)*, **29**, (1), (2000).

Morais, M. C. and Pacheco, A., Some stochastic properties of upper one-side X and EWMA for μ in the presence of shifts in σ .

Nunes, C. and Pacheco, A., State estimation of the Markov chain of an MMPP, to appear in Actas do VII Congresso Anual da SPE, Ofir, Portugal.

Paulino, C. D. and Soares, P., Incomplete categorical data: A Bayesian perspective, to appear in *Journal of Statistical Computation and Simulation*, Preprint 20/99.

Paulino, C. D., Modelação e análise de dados Poisson sob censura não informativa - Parte I: Modelação e ajustamento de modelos de censura, to appear in Actas do VII Congresso Anual da SPE, Ofir, Portugal.

Paulino, C. D. and Soares, P., Modelação e análise de dados Poisson sob censura não informativa, parte II - ajustamento de modelos estruturais para as taxas e aplicações, to appear in Actas do VII Congresso Anual da SPE, Ofir, Portugal.

Pires, A. M. and Branco, J. A., Confidence intervals for a threshold parameter, to appear in COMPSTAT 2000: Short Communications in Computational Statistics.

Silva, G. L. and Amaral-Turkman, M. A. A., Bayesian analysis of an additive survival model with frailty, to appear in *Lifetime Data Analysis*, Preprint 23/99.

Applied Mathematics and Numerical Analysis

Alves, C. J. S. and Kress, R., On the far field operator in elastic obstacle scattering.

Alves, C. J. S., Ha Duong, T. and Penzel, F., On the identification of conductive cracks, to appear in the Proceedings of ISIP 2000, Nagano, Japan.

Alves, C. J. S. and Pires, G., Sound soft screen detection in the near field, to appear in the Proceedings of ISIP 2000, Nagano, Japan.

Graça, M., Nonhyperbolic fixed points and flat iteration functions, Preprint 32/99.

Graça, M., Efeitos colaterais no uso de máquinas de calcular, to appear in *Gazeta de Matemática*.

Lima, P. M. and Oliveira, A. M., Aproximação de problemas de valores de fronteira singulares usando subsoluções e supersoluções, to appear in Proceedings da XIII CNMAC, Brasil, Preprint 35/99.

Diogo, M. T., Lima, P. M. and Franco, N., Analysis of product integration methods for a class of singular Volterra integral equations, to appear in Proceedings da XIII CNMAC, Brasil.

Pileckas, K., Sequeira, A. and Videman, J. H., Steady flows of viscoelastic fluids in domains with outlets to infinity, to appear in *J. Math. Fluid. Mech.*, Preprint 33/99.

Sequeira A. and Videman, J. H., Mathematical results and numerical methods for steady incompressible viscoelastic fluid flows, (Vajravelu, K. et al. Eds.), *Advances in Differential Equations and Nonlinear Mechanics* (dedicated to Professor V. Lakshmikantham 75th birthday), Kluwer Academic Publishers, Series: Mathematics and its Applications.

Computer Science

Caleiro, C., Sernadas, C. and Sernadas, A., Mechanisms for combining logics.

Campagnolo, M., Moore, C. and Costa, J.-F., An analog characterization of the subrecursive functions.

Campagnolo, M., Moore, C. and Costa, J.-F., Iteration, inequalities, and differentiability in analog computers.

Carmo, J. and Pacheco, O., Deontic and action logics for collective agency and roles, to appear in Proceedings of the Fifth International Workshop on Deontic Logic in Computer Science (DEON'00), (R. Demolombe and R. Hilpinen, Eds.), ONERA-DGA, (2000), 93-124.

Demolombe, R., Jones, A. and Carmo, J., An application of deontic logic to the analysis of information systems constraints, to appear in Proceedings of the Fifth International Workshop on Deontic Logic in Computer Science (DEON'00), (R. Demolombe and R. Hilpinen, Eds.), ONERA-DGA, (2000), 147-166.

Lourenço, H. and Sernadas, A., Combining hybrid systems.

Lourenço, H. and Sernadas, A., An institution of hybrid systems.

Mateus, P., Sernadas, A. and Sernadas, C., Realization of probabilistic automata: Categorical approach.

Neto, J.-P., Costa, J.-F. and Ferreira, A., Merging symbolic and subsymbolic computation, to appear in Proceedings of the Second International ICSC Symposium on Neural Computation (NC'2000), (R. Rojas, Ed.), ICSC Academic Press.

Ravara, A. and Vasconcelos, V., Typing non-uniform concurrent objects.

Ravara, A., Resende, P. and Vasconcelos, V., An algebra of behavioural types.

Resende, P., Quantales and observational semantics, in Current research in operational quantum logic: Algebras, categories and languages, fundamental theories of physics, (B. Coecke, D. Moore, and A. Wilce, Eds.), Kluwer Academic Publishers, (2000), 263-288, Preprint 43/99.

Resende, P., Quantales, concurrent observations and event structures, Preprint 14/99.

Schröder, L. and Mateus, P., Universal aspects of probabilistic automata.

Zanardo, A., Sernadas, A. and Sernadas, C., Fibring: Completeness preservation.

Sernadas, A., Book Review - Fibring Logics by Dov M. Gabbay, to appear in *Journal of Logic, Language, and Information*.

Sernadas, C., Book Review - Fibring Logics by Dov M. Gabbay, to appear in *Studia Logica*.

2 Academic degrees awarded in 1999

2.1 Doutoramentos/PhD's

Granja, G., Ph. D in Mathematics, Massachusetts Institute of Technology, June 1999. Thesis: *On quaternionic line bundles*. Supervisor: Mike Hopkins.

Godinho, L., Ph. D. in Mathematics, State University of New York at Stony Brook, May 1999. Thesis: *Circle actions on symplectic manifolds*. Supervisor: Dusa McDuff.

Guerra, A. S., Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 29.6.99. Thesis: *Defaults in the Specification of Reactive Systems*. Supervisor: Mark Ryan and Amílcar Sernadas.

Mackaay, M., Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 21.12.99. Thesis: *Categorical construction of four-dimensional topological field theories*. Supervisor: Louis Crane, Co-supervisor: Roger Picken.

Oliveira, L. Ph. D. in Mathematics, University of Oxford, November 1999. Thesis: *Partial Jordan *- Triples*. Supervisor: C. M. Edwards.

Santos, A. M., Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 12.4.99. Thesis: *Minimal normalization of Wiener-Hopf operators and applications to Sommerfeld diffraction problems*. Supervisor: Frank Speck.

Santos, P. F., Ph. D. in Mathematics, State University of New York at Stony Brook, August 1999. Thesis: *Algebraic cycles on real varieties and $Z/2$ -equivariant homotopy theory*. Supervisor: H. Blaine Lawson, Jr.

Santos, R. C. P., Doutoramento em Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa, 19.02.99. Thesis: *Dinâmica Simbólica Linear*. Supervisor: Rui Vilela Mendes.

2.2 Mestrados/MSc's

Andrade, C. F., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 28.04.99. Thesis: *Séries formais e transformação de Fourier*. Supervisor: Luis Canto de Loura.

António, N., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 19.1.99. Thesis: *Álgebras - C^* de rotação: Propriedades elementares e de estrutura*. Supervisor: António Ferreira dos Santos.

Borges, L. C., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 22.07.99. Thesis: *Método de domínios fictícios para problemas elípticos*. Supervisor: Adélia Sequeira.

Carvalho, C. C., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 17.09.99. Thesis: *Álgebras localmente convexas*. Supervisor: Francisco Sepúlveda Teixeira.

Conceição, A. C., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 27.07.99. Thesis: *Factorização de funções matriciais e o resolvente de certos operadores*. Supervisor: Francisco Sepúlveda Teixeira.

Malheiro, M. T. M., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 30.09.99. Thesis: *Factorização generalizada de uma classe de símbolos matriciais*. Supervisor: Cristina Câmara.

Martins, S. G., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 25.06.99. Thesis: *Estruturas lógicas proposicionais monótonas e não-monótonas*. Supervisor: Francisco Miguel Dionísio.

Mascarenhas, H. N., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 20.09.99. Thesis: *Teoria de Gelfand generalizada. Álgebras geradas por operadores de Toeplitz e Hanzel*. Supervisor: Amélia Bastos.

Oliveira, H. B., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa, 15.06.99. Thesis: *Métodos variacionais e o problema de segmentação de imagem*. Supervisor: José Matias.

Ribeiro, P. M. C., Mestrado em Matemática Aplicada, Instituto Superior Técnico, Universidade Técnica de Lisboa. Thesis: *Estudo da difracção de ondas acústicas na proximidade do obstáculo. Problemas directo e inverso*. Supervisor: Carlos Alves.

Silva, J., Master of Arts in Applied and Computational Mathematics, Princeton University.

Ventura, J., Master of Science in Mathematics, Stanford University.

3. Research Lectures

3.1 Lectures at Conferences, Workshops, Meetings etc.

Algebra and Mathematical Analysis

Abreu, M., Kähler geometry of toric varieties in symplectic coordinates, Prospects in Geometry Conference, Leipzig, Germany, 18.11.99 - 20.11.99.

Abreu, M., On the first invariant eigenvalue of S^1 invariant metrics on S^2 , Summer School on Differential Geometry, CIM, Coimbra, Portugal, 3.9.99 - 7.9.99.

Barreira, L., Birkhoff ergodic theorem revisited, Workshop on Smooth Ergodic Theory, Lisbon, Portugal, 29.03.99 - 31.03.99.

Cannas da Silva, A., Number theory and quantization of toric actions, Meeting of the American Mathematical Society, Buffalo, New York, USA, 24.4.99 - 25.4.99.

Correia, J. M. L., Diffusive-dispersive limits for multidimensional conservation laws, Hyperbolic Systems of Conservation Laws, Lisbon, Portugal, 22.4.99 - 24.4.99.

Fernandes, R. L., Contravariant connections on Poisson manifolds, Summer School on Differential Geometry, (Wegner, B., Eds.), Universidade de Coimbra, Portugal, 3.9.99.

Fernandes, R. L., Geometry and quantization of symplectic manifolds, Centro Stefano Franscini, ETH Zürich, 4.7.99 - 9.7.99.

Godinho, L., Blowing up symplectic manifolds, American Mathematical Society Sectional Meeting, University of Illinois at Urbana-Champaign, USA, 18.3.99 - 21.3.99.

Matias, J., A volume constrained variational problem in SBV_2 , New Trends in The Calculus of Variations, Lisbon, Portugal, October 1999.

Oliva, W. M., and Freitas, P., Hyperbolicity and one-to-oneness, Functional Differential Equations, Lisbon, Portugal, 26.7.99 - 30.7.99.

Oliveira, L., A estrutura algébrica de Jordan de algumas álgebras de operadores, Seminário de Análise Funcional e Aplicações, Lisbon, Portugal, 25.06.99.

Picken, R., Categorical constructions related to TQFT, Category Theory 99 (CT99), Coimbra, Portugal, 19.7.99 - 24.7.99.

Rocha, C., On the gradient structure of the FitzHugh-Nagumo system, International Conference on Differential Equations - Equadiff 99, Berlin, Germany, 1.08.99 - 7.08.99.

Speck, F.-O., Regularity properties and generalized inverses of delta-related operators, International Conference on Recent Advances in Analytical and Numerical Treatment of Operator Equations, Klaffenbach/Chemnitz, Germany, 25.03.99 - 28.03.99.

Statistics and Applications

Amado, M. C., Comparação entre três métodos para robustecer o método, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Amado, M. C., The bootstrap and contaminated data, Young Statisticians' Meeting 1999, Bristol, England, 25.3.99 - 26.3.99.

Antunes, N., Pacheco, A., and Rocha, R., A traffic model for a broad band wireless network in a high way in VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Branco, J. A., and Oliveira, R., Robust canonical correlation analysis, 11th European Meeting of the Psychometric Society, Lueneburg, Germany, 19.7.99 - 22.7.99.

Branco, J. A., and Souto de Miranda, M. M., The tuning constant problem in regression type models, The 6th Tartu Conference on Multivariate Analysis, 19.8.99 - 23.8.99.

Morais, M. and Pacheco, A.,

- Increment Decision Rule: an alternative decision rule in quality control, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.
- Misleading signals in joint schemes for μ and σ , VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.
- A new procedure for reacting to an increase in the expected number of defects per sample, 10th INFORMS Applied Probability Conference, Ulm, Germany, 26.7.99 - 28.7.99.
- The effect of shifts in μ in the performance of Shewart and EWMA charts for σ , ASMDA99 - Applied Stochastic Models and Data Analysis: Quantitative Methods in Business and Industry Society, 14.6.99 - 17.6.99.
- Ordenação estocástica e tempos de primeira passagem, Computer Science Seminar, IST, Lisbon, Portugal, 19.1.99.

Nunes, C. and Pacheco, A.,

- State estimation of the Markov chain of an MMPP, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.
- Estimation of HMM parameters through Bayesian sampling, 10th INFORMS Applied Probability Conference, University of Ulm, Germany, 26.7.99 - 28.7.99.
- Stability for input-output systems, ASMDA99 - Applied Stochastic Models and Data Analysis; Quantitative Methods in Business and Industry Society, 14.6.99 - 17.6.99.

Oliveira, M. R.,

- Estimação em análise de correlações canónicas pelo método de projection pursuit, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.
- Estimation in canonical correlation analysis based on influence functions, European Meeting of the Psychometric Society, Lueneburg, Germany, 19.7.99 - 22.7.99.
- Estimation in canonical correlation analysis, Young Statisticians' Meeting 1999, Bristol, England, 25.3.99 - 26.3.99.

Paulino, C. D.,

- Análise clássica de dados omissos sob censura não informativa, Workshop on Misclassification and Missing Information in Categorical Data, CMA-IST, Lisbon, Portugal, 20.10.99.
- Análise Bayesiana de dados omissos sob vários tipos de censura, Workshop on Misclassification and Missing Information in Categorical Data, CMA-IST, Lisbon, Portugal, 21.10.99.
- Analysing linear models for categorical data by maximum likelihood via SAS System, CAUS 99 - 5ª Conferência Anual dos Utilizadores SAS - Knowledge Creation, Lisbon, Portugal, 26.10.99 - 27.10.99.
- Viabilização no SAS da análise por máxima verosimilhança de modelos lineares em dados categorizados, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.
- Modelação e análise de dados Poisson sob censura não informativa, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.
- Metodologia inferencial Bayesiana, Short Course on Estatística Bayesiana, FCUL and IST, Lisbon, Portugal, 02.02.99 - 03.02.99.

Pedro, S., Branco, J. B. and Lina, M. B., Análise de Fourier e análise multivariada aplicadas ao estudo da forma de folhas de videira e de medronheiro, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Pedro, S., Lima, M. B. and Branco, J. A., Classificação e caracterização dos medronheiros Algarvios por métodos de taxonomia numérica, 2º Colóquio Valorização da Aguardente de Medronho, São Brás de Alportel, 24.06.99.

Pires, A. M. and Rodrigues, I., Modelo de regressão com alguns erros correlacionados, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Pires, A. M. and Santos, C., Sobre o reconhecimento de padrões, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Ramalhoto, M. F., A framework for quality improvement of queueing systems of the service industry, Invited Lecture to the Session Quality and Reliability Improvement of the International Statistical Institute, 52nd ISI Session, Finland, 10.8.99 - 18.8.99.

Silva, G. L.,

- Analysing linear models for categorical data by maximum likelihood via SAS. 5^a Conferência Anual dos Utilizadores SAS, Lisbon, Portugal, 26.10.99 - 27.10.99.
- Modelos de sobrevivência com fragilidade: Uma introdução, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.
- Viabilização no SAS da análise por máxima verosimilhança de modelos lineares em dados categorizados, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Soares, P., Analysing linear models for categorical data by maximum likelihood, CAUS 99 - 5^o Congresso Anual dos Utilizadores de SAS, Lisbon, Portugal, 26.10.99 - 27.10.99.

Soares, P., and Paulino, C. D., Modelação e análise de dados Poisson sob censura não informativa, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Soares, P., Paulino, C. D. and Silva, G. L., Viabilização no SAS da análise por máxima verosimilhança de modelos lineares em dados categorizados, VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Applied Mathematics and Numerical Analysis

Alves, C. J. S., Crack detection using spherical incident waves and near-field measurements, Boundary elements XXI, Oxford, 25.08.99 - 27.08.99.

Carpentier, M. P., Numerical solution of a singular boundary-value problem, EPMESC - International Conference on Enhancement and Promotion of Computational Methods in Engineering and Science, Macau, 2.8.99 - 5.8.99.

Lima, P. M., Numerical Approximation of singular boundary-value problems for generalized Emden-Fowler equations, European Conference on Numerical Mathematics, Jyvaskylla, Finland, 26.7.99 - 30.7.99.

Lima, P. M., Aproximação de problemas de valores de fronteira singulares usando subsoluções e supersoluções, XXII Conferência Nacional de Matemática Aplicada e Computacional, Santos, Brasil, 13.9.99 - 17.9.99.

Diogo, M. T., On product integration methods for a class of Volterra integral equations with weakly singular kernel, XXII Conferência Nacional de Matemática Aplicada e Computacional, Santos, Brasil, 13.9.99 - 17.9.99.

Sequeira, A.,

- On the steady motion of non-Newtonian fluids in infinite pipes, International Conference on Partial Differential Equations and Applications - in honor of the 70th birthday of Prof. J. Necas, Olomouc, Czech Republic, 13.12.99 - 17.12.99.

- Numerical methods for viscoelastic fluid models, International Workshop in Experimental, Computational and Mathematical Fluid Dynamics, Pittsburgh, U.S.A., 4.11.99 - 6.11.99.
- Steady flows of Oldroyd type fluids in domains with cylindrical outlets, VII International Conference on Navier-Stokes Equations and Related Nonlinear Problems, Ferrara, Italy, 14.9.99 - 18.9.99.
- Sur quelques méthodes numériques pour les fluides non-Newtoniens de grade deux, Journée Internationale de Mathématiques Appliquées, Carthage, Tunisia, 24.6.99.
- Mathematical results and numerical methods for steady incompressible viscoelastic fluid flows, International Conference on Differential Equations, Numerical Analysis and Nonlinear Mechanics - in honor of the 75th birthday of Prof. V. Lakshmikantham, University of Central Florida, Orlando, U.S.A., 17.3.99 - 19.3.99.

Silvestre, A. L.V.,

- Unsteady Motion of a SEI-Propelled Body in a Navier-Stokes Fluid- Workshop in Experimental, Computational and Mathematical Fluid Dynamics, Pittsburgh, USA, 5.11.99
- On the Self-Propelled Motion of a Body in viscous Incompressible Fluid - Thematic Term on Theoretical and Computational Fluid Dynamics, CIM, Coimbra, 15.07.99

Computer Science

Caleiro, C.,

- Pushouts vs co-Cartesian liftings, Encontro LOGCOMP, Lisboa, Portugal, 6.12.99.
- Trios, Encontro ACL-LOGCOMP, Coimbra, Portugal, 10.2.99 - 11.2.99.

Dionísio, F. M., Structuring defaults for features, Joint ASPIRE/FIREworks Meeting, Evry, France, 8.4.99 - 10.4.99.

Lourenço, H.,

- Model checking within the institution of hybrid systems, Encontro LOGCOMP, Lisboa, Portugal, 6.12.99.
- An institution of hybrid systems, 14th WADT, Château de Bonas, France, 15.9.99 - 18.9.99.
- Logic of hybrid systems: Institution, Joint ASPIRE/FIREworks Meeting, Evry, France, 8.4.99 - 10.4.99.
- Institution of hybrid systems, Encontro ACL-LOGCOMP, Coimbra, Portugal, 10.2.99 - 11.2.99.

Mateus, P.,

- Universal realization of probabilistic automata, Encontro LOGCOMP, Lisboa, Portugal, 6.12.99.
- Combining probabilistic automata: categorical approach, 14th WADT, Château de Bonas, France, 15.9.99 - 18.9.99.
- Precategories for combining probabilistic automata, CTCS'99, Edinburgh, UK, 10.9.99 - 12.9.99.
- Precategories and applications to probabilistic automata, Category Theory 99, Coimbra, Portugal, 19.7.99 - 24.7.99.
- Non-determinism and uncertainty in the situation calculus, FLAIRS'99, Orlando, USA, 3.5.99 - 5.5.99.
- Precategories, Joint ASPIRE / FIREworks Meeting, Evry, France, 8.4.99 - 10.4.99.
- Adjunctions in precategories, Encontro ACL-LOGCOMP, Coimbra, Portugal, 10.2.99 - 11.2.99.

Rasga, J.,

- Fibring of labelled deductive systems, Encontro LOGCOMP, Lisboa, Portugal, 6.12.99.
- Model theoretic fibring of logics with terms and binding operators, ASPIRE Meeting, Linz, Austria, 24.9.99 - 25.9.99.

Ravara, A.,

- Typing non-uniform concurrent objects, Encontro LOGCOMP, Lisboa, Portugal, 6.12.99.
- Programming and implementation issues in non-uniform TyCO, OOSDS'99 (Satellite Event of ICFP'99), Paris, France, 26.9.99.
- Typing non-uniform concurrent objects, ASPIRE Meeting, Linz, Austria, 24.9.99 - 25.9.99.

Resende, P., Quantaes of concurrent observations, Encontro ACL-LOGCOMP, Coimbra, Portugal, 10.2.99 - 11.2.99.

Sernadas, A., Fibring: Completeness preservation?, Encontro ACL-LOGCOMP, Coimbra, Portugal, 10.2.99 - 11.2.99.

Sernadas, C., Fibring of algebraic semantics, Encontro ACL-LOGCOMP, Coimbra, Portugal, 10.2.99 - 11.2.99.

3.2 Invited lectures

Algebra and Mathematical Analysis

Abreu, M., Topology of symplectomorphism groups and spaces of symplectic forms, Topology Seminar, CRM, Barcelona, Spain, 29.7.99.

Barreira, L.,

- Estrutura produto de conjuntos e medidas hiperbólicas, Universidade do Porto, Portugal, May 1999.
- Hiperbolicidade e multifractalidade, Universidade de Lisboa, Portugal, February 1999.

Cannas da Silva, A.,

- Folded symplectic manifolds, University of Illinois, Urbana-Champaign, USA, 31.8.99.
- Geometry combinatorics, Bryn Mawr College, Philadelphia, USA, 23.4.99.
- Geometria simpléctica e combinatória de politopos, Universidade do Porto, Porto, Portugal, 29.3.99.
- Folded symplectic structures, Universidade de Lisboa, Lisbon, Portugal, 3.3.99.

Duarte, P. M.,

- Persistência de tangências homoclínicas em difeomorfismos simplécticos multi-dimensionais, IMPA, Rio de Janeiro, Brasil, 26.05.99.
- Persistência de tangências homoclínicas em difeomorfismos simplécticos multi-dimensionais, Universidade Federal de Belo Horizonte, Belo Horizonte, Brasil, 24.05.99.

Fernandes, R. L., Contravariant connections in Poisson geometry, CMAF, Lisbon, Portugal, 27.10.99.

Florentino, C., Moduli spaces de fibrados sobre superfícies de Riemann, Seminar of Geometry and Combinatorics, Faculdade de Ciências, Porto, Portugal, 3.2.99.

Freitas, P.,

- Admissible spectral sequences for quadratic pencils, International Workshop of Vibrating Systems 99, Canmore, Canada, 26.9.99 - 28.9.99.
- Invariant eigenvalues and eigenfunctions of the Laplacian on surfaces, Kungl. Tekniska Högskolan, Estocolmo, Sweden, August 1999.
- FitzHugh-Nagumo systems. Nonlinear parabolic problems, Lisbon, Portugal, 13.5.99 - 16.5.99.
- Spectral sequences for quadratic pencils and the inverse spectral problem for the damped wave equation, École Polytechnique, Paris, France, March 1999.
- Espectro de lápis quadráticos e o problema espectral inverso para a equação de onda amortecida, CMAF, Lisbon, Portugal, January 1999.

Godinho, L.,

- Quotients Kähleriens et les variétés Lagrangiennes especiales, IRMA - Université Louis Pasteur, Strasbourg, France, November 1999.

- Circle actions on symplectic manifolds, Symplectic Geometry Seminar, Stony Brook University, New York, USA, April 1999.

Nunes, J. P.,

- Seiberg-Witten theories: Solving quantum field theories with geometry, Seminário do grupo de Física-Matemática, Faculdade de Ciências, Universidade de Lisboa, Portugal, May 1999.
- Seiberg-Witten and integrability, Departamento de Matemática, Universidade do Algarve, Portugal, 24.2.99 - 26.2.99.

Oliva, W. M., Hyperbolicity in retarded differential equations, MAP-USP Conference, 1.10.99 and the Seminar of the Differential Equations - IMECC-Unicamp, Brazil, 21.10.99.

Pinto, M. V., On the module, Mathematics Department of the Genova University, Italy, 22.11.99.

Rocha, C., Towards a classification of attractors for reaction-diffusion equations by meander permutations, Universidade Complutense de Madrid, Spain, 23.11.99.

Santos, A. M., Normalização minimal de operadores de WH, Universidade do Algarve, Faro, Portugal, 20.1.99.

Santos, P. F., Algebraic cycles on real varieties and $Z/2$ -equivariant homotopy theory, Texas A&M University, College Station, Texas, USA, September 1999.

Sousa Ramos, J.,

- Caos e complexidade, Universidade da Madeira, Funchal, Portugal, December 1999.
- Da complexidade da natureza à complexidade da matemática, PROFMAT99, Portimão, Portugal, 13.11.99.
- Medidas da complexidade e estruturas de decisão, Workshop sobre Decisão e Complexidade, Complexo Interdisciplinar II, Lisbon, Portugal, 29.9.99.
- Onde procurar a ordem nas séries temporais da economia? Conferência sobre Complexidade na Economia, ISEG, Lisbon, Portugal, 7.5.99 - 8.5.99.

Speck, F.-O., Regularity properties and generalized inverses of delta-related operators, Universidade do Algarve, Faro, Portugal, 3.12.99.

Statistics and Applications

Branco, J. A.,

- Modelos espaciais para análise de proximidades, Seminário de Probabilidades e Estatística do CMUC, Departamento de Matemática, Universidade de Coimbra, Portugal, 23.6.99.

- Modelos para análise de medidas de proximidade, Conferência organizada pela Sociedade Portuguesa de Estatística e Centro de Investigação em Matemática e Aplicações da Universidade de Évora, Portugal, 11.2.99.

Morais, M. and Pacheco, A., Stochastic ordering in the performance analysis of quality control charts, Technische Universität Berlin (Institut für Technische Informatik), Berlin, Germany, 29.7.99.

Morais, M. , Ordenação estocástica: história e aplicações, Instituto Superior de Engenharia de Lisboa, Lisbon, Portugal, 18.6.99.

Applied Mathematics and Numerical Analysis

Alves, C. J. S.,

- Resultats de densité et unicité pour le probleme inverse de diffraction, École Normale d'Ingenieurs de Tunis, Tunisia, 15.12.99.
- Steady flows of viscoelastic fluids in channels and pipes, Institute for Mathematics, University of Zürich, Switzerland, 11.11.99.
- Mathematical results and numerical methods for some non-Newtonian fluid models, Center of Nonlinear Analysis, Carnegie Mellon University, Pittsburgh, U.S.A., 2.11.99.
- Inverse Obstacle Scattering with Cracks, Institute for Mathematics, University of Goettingen, Germany, 19.10.99.

Sequeira, A., Identificação de obstáculos através da difracção de ondas acústicas, Universidade de Coimbra, Portugal, 03.12.99.

Silvestre, A. L.V., On the Motion of a Ridgid Body in a Viscous Incompressible Fluid - Universidade de Tunis. Tunisia, 15.12.99.

Videman, J. H.

- Asymptotic behaviour at infinity of threedimensional steady viscoelastic fluids, Institut für Mathematik der Universität Zürich, Switzerland, 18.11.99.
- Mathematical analysis of viscoelastic fluids, Seminar at the Universität Karlsruhe, Germany, 12.11.99.
- Asymptotic behaviour at infinity of threedimensional steady viscoelastic fluids, Seminar at the Departament of Mathematics of Helsinki University of Technology, Espoo, Finland, 9.11.99.
- Mathematical analysis of non-Newtonian viscoelastic fluids, Seminar at the Technical University of Vilnius, Lithuania, 2.11.99.
- Steady flows of viscoelastic fluids in domains with outlets to infinity, Seminar at the Institute of Mathematics and Informatics, Vilnius, Lithuania, 25.10.99.

- Análise matemática de fluidos viscoelásticos, Seminário no Departamento de Matemática, Universidade de Coimbra, Portugal, 25.01.99.

Computer Science

Ravara, A.,

- Typing non-uniform concurrent objects - II, INRIA, Sophia-Antipolis, France, 2.6.99.
- Typing non-uniform concurrent objects, IRIT, Toulouse, France, 27.5.99.
- Typing non-uniform concurrent objects - I, INRIA, Sophia-Antipolis, France, 7.4.99.
- What is TyCO after all?, Faculdade de Ciências da Universidade de Lisboa, Lisbon, Portugal, 3.3.99.
- Typing non-uniform concurrent objects, Aarhus University, Denmark, 18.2.99.
- Typing non-uniform concurrent objects - II, Aalborg University, Denmark, 5.2.99.
- Typing non-uniform concurrent objects - I, Aalborg University, Denmark, 15.1.99.

Resende, P.,

- Sup-lattice-ordered algebras, Algebraic Seminar, Masaryk University, Brno, Czech Republic, 9.12.99.
- Quantales, concurrent observations and event structures, Algebraic Seminar, Masaryk University, Brno, Czech Republic, 21.10.99.

4. Guest Programme

Algebra and Mathematical Analysis

Adiou, M., Cadi Ayyad University, Marrakech, 26.7.99 - 30.7.99.

Alves, J. F., Universidade do Porto, 28.3.99 - 31.3.99.

Anashkin, O. V., Simferopol State University, Simferopol, 26.7.99 - 30.7.99.

Anisov, S., Centro de Análise Matemática, Geometria e Sistemas Dinâmicos, IST, Portugal.

Lectures:

- Kirby Calculus on 3-manifolds (part IV), 18.11.99.
- Kirby Calculus on 3-manifolds (part III), 4.11.99.
- Kirby Calculus on 3-manifolds (part II), 14.10.99.
- Kirby Calculus on 3-manifolds (part I), 7.10.99.
- Convex curves in projective spaces, 24.11.99.
- Topological complexity of T2-bundles over the circle, 28.9.99.

Araújo, V., Universidade do Porto, Portugal, 11.1.99 - 12.1.99. *Lecture:* Attractors and time averages for random maps, 12.1.99.

Asch, M., Université de Paris XI, Paris-Sud, France, 12.9.99 - 16.9.99. *Lecture:* The spectrum of the damped wave operator on geometrically complex domains in \mathbb{R}^2 , 14.9.99.

Audin, M., Université Louis Pasteur, Strasbourg e CNRS, 14.6.99 - 2.7.99 , 13.10.99 - 18.10.99. *Lecture:* Não integrabilidade de certos sistemas hamiltonianos, 13.10.99.

Auroux, D., Ecole Polytechnique, 21.6.99 - 26.6.99.

Baez, J., University of California at Riverside, USA, 8.7.99 - 12.7.99, 25.7.99 - 5.8.99. *Lecture:* The quantum tetrahedron, 29.07.99.

Barrett, J. W., University of Nottingham, England, December 1999. *Lecture:* Quantum topology.

Barrett, J., Univ. Nottingham, United Kingdom, 15.12.99 - 22.12.99. *Colloquium:* Quantum Topology, 16.12.99.

Bátkai, A., University Tuebingen, Tuebingen, 26.7.99 - 30.7.99.

Bélair, J., Université de Montréal, Quebec, 26.7.99 - 30.7.99.

Biran, P., Stanford University, 21.6.99 - 26.6.99.

Boto, J. P., Universidade de Lisboa, Portugal, 23.11.99. *Lecture*: Espalhamento para uma equação de onda com comportamentos assintóticos espaciais diferentes à esquerda e à direita, 23.11.99.

Boushaba, K., Cadi Ayyad University, Marrakech, 26.7.99 - 30.7.99.

Bouzahir, H., Cadi Ayyad University, Marrakech, 26.7.99 - 30.7.99.

Bruzzo, U., SISSA, Italy, 7.2.99 - 17.2.99.

Buczolich, Z., Eötvös Loránd University, Budapest, 27.3.99 - 1.4.99.

Burenkov, V. I., University of Wales, Cardiff, UK, July 1999. *Lecture*: Estimates for regularized solutions of integral equations of convolution type in spaces with fractional order of smoothness.

Carvalho, S. P., Universidade Federal de Minas Gerais, Brazil, 29.4.99 - 30.4.99. *Lecture*: Bilhares planos, 29.4.99.

Castro, H. M., IME, Universidade de São Paulo, Brazil, 23.1.99 - 13.2.99. *Lecture*: Fluxos geodésicos parcialmente hiperbólicos em distribuições, 11.2.99.

Ceppitelli, R., Università degli Studi di Perugia, Perugia, 26.7.99 - 30.7.99.

Chabrowski, J., University of Queensland, 1.10.99 - 28.10.99. *Lectures*:

- The Neumann problem involving a critical Sobolev exponent, 19.10.99.
- Semiclassical solutions of the Schroedinger equation involving critical Sobolev exponent, 12.10.99.

Chirila, F., West Virginia University, Morgantown, 26.7.99 - 30.7.99.

Costa, M. J., Universidade do Porto, 28.3.99 - 31.3.99.

Crane, L., Kansas State University, USA, 1.1.99 - 30.3.99, 15.12.99 - 31.12.99. *Seminar*: The representation theory of the quantum Lorentz algebra and applications to quantum gravity, 16.12.99.

Cruzeiro, A. B., Universidade de Lisboa, Portugal. *Lecture*: Alguns aspectos da geometria do espaço dos caminhos sobre uma variedade Riemanniana, 20.4.99.

Damianou, P., University of Cyprus, 2.5.99 - 17.5.99. *Lecture*: The A-D-E problem, Poisson manifolds and singularities, 11.5.99.

Derfel, G., Ben-Gurion University, Beer-Sheva, 26.7.99 - 30.7.99.

Dias, J. P., Universidade de Lisboa, Portugal *Lecture*: Alguns aspectos da formação de singularidades em equações hiperbólicas quase lineares, 26.1.99.

- Dzhenaliev, M., Institute of Theoretical and Applied Mathematics, Almaty, 26.7.99 - 30.7.99.
- Elbaz, R., Cadi Ayyad University, Marrakech, 26.7.99 - 30.7.99.
- Eliashberg, Y., Stanford University, 21.6.99 - 26.6.99.
- Ezzinbi, K., Cadi Ayyad University, Marrakech, 26.7.99 - 30.7.99.
- Fernandes, S., Universidade de Évora, Évora, 26.7.99 - 30.7.99.
- Fernandes, T. M., Universidade de Lisboa, Portugal. *Lecture: Aplicações dos funtores de cohomologia temperada e formal de Kashiwara e Schapira*, 16.3.99.
- Fernandez, B., Grupo de Física Matemática, UL e CNRS, Portugal. *Lecture: Topological properties of expanding coupled map lattices*, 9.11.99.
- Fichmann, L., Universidade de São Paulo, São Paulo, 26.7.99 - 30.7.99.
- Fitzgibbon, W., University of Houston, Texas, 26.7.99 - 30.7.99.
- Galperin, E., Université du Québec a Montréal, Québec, 26.7.99 - 30.7.99.
- Geiges, H., Leiden University, 21.6.99 - 26.6.99.
- Giannakopoulos, F., German National Research Center for Information Technology, Sankt Augustin, 26.7.99 - 30.7.99.
- Ginzburg, V., University of California, Santa Cruz, 21.6.99 - 26.6.99.
- Giroux, E., Ecole Normale Supérieure, Lyon, 21.6.99 - 26.6.99.
- Gohberg, I., Tel Aviv University, Israel, 1.6.99 - 8.6.99. *Lecture: Determinants and traces of linear operators.*
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- Grassmannians and the moduli of algebraic curves, 6.5.99.
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- Guillemin, V., Massachusetts Institute of Technology, 21.6.99 - 26.6.99.
- Gyori, I., University of Veszprém, Veszprém, 26.7.99 - 30.7.99.
- Hale, J. K., Georgia Institute of Technology, Atlanta, 26.7.99 - 30.7.99.
- Heiden, U., University of Witten/Herdecke, Witten, 26.7.99 - 30.7.99.

Hironaka, E., Florida State University, USA, 24.6.99 - 1.7.99. *Lecture: Graph manifolds for complex projective plane curves, 29.6.99.*

Horváth, L., University of Veszprém, Veszprém, 26.7.99 - 30.7.99.

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Huang, Y. S., Pace University, Pleasantville, 26.7.99 - 30.7.99.

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Jiang, Y., ETH, Zürich, 27.3.99 - 1.4.99.

Kaloshin, V., Princeton University, 27.3.99 - 1.4.99.

Karlovich, Yu., CINVESTAV del I.P.N., Mexico, October 1999. *Lecture: Singular integral operators with matrix oscillating coefficients on Lebesgue spaces.*

Karshon, Y., Hebrew University, 21.6.99 --26.6.99.

Khaladi, M., Cadi Ayyad University, Marrakech, 26.7.99 --30.7.99.

Kilbas, A. A., University of La Laguna, Tenerife, and Belorussia University, Minsk, 19.3.99. *Lecture: Mittag-Leffler type functions and the solution of integral and differential equations.*

Kinderlehrer, D., Carnegie Mellon University, Pittsburgh, USA, 21.3.99 - 24.3.99. *Lecture: Dynamics of the Fokker-Planck equation and new interpretations of diffusion, 23.3.99.*

Klüniger, M., Universität Bremen, 27.3.99 - 1.4.99.

Koo, Y., Centro de Análise Matemática, Geometria e Sistemas Dinâmicos, IST, Portugal. *Lecture: An introduction to the generalized evolution by mean curvature plus a forcing term and its sharp growth rate, 30.11.99.*

Korotkin, D., Max-Planck-Institut für Gravitationsphysik, Golm/Potsdam, Germany, 19.11.99. *Lecture: Solutions of a class of Riemann-Hilbert problems in terms of theta-functions and their applications to integrable systems.*

Kosareva, N., Moscow State Institute of Electronics and Mathematics, Moscow), 26.7.99 - 30.7.99.

Kovalev, A., Moscow State Institute of Electronics and Mathematics, Moscow), 26.7.99 - 30.7.99.

Krámlí, A., József Attila University, Szeged, 27.3.99 - 1.4.99.

Krisztin, T., Attila József University of Szeged, Szeged, 6.7.99 - 30.7.99.

Ladas, G., University of Rhode Island, Kingson, 26.7.99 - 30.7.99.

Ladeira, L., Universidade de São Paulo, São Carlos, 26.7.99 - 30.7.99.

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Pileckas, K., Institute for Math. and Informatics, Vilnius, Lithuania, 16.4.99 - 15.5.99, *Lecture*: On the Stokes problem in an infinite layer, 14.5.99.

Computer Science

Basin, D., University of Freiburg, Germany, 24.5.99 - 28.5.99. *Lecture*: Deriving and applying program synthesis calculi, 28.5.99.

Campagnolo, M., ISA, Portugal and Santa Fe Institute, USA, 15.11.99 - 20.11.99. *Lecture*: Analog computation of subrecursive functions.

Carnielli, W., University of Campinas, Brazil, 7.6.99 - 11.6.99. *Lecture*: Semântica de traduções possíveis, 11.6.99.

Costa, J.-F., Faculdade de Ciências da Universidade de Lisboa, Portugal, 26.2.99. *Lecture*: Analog computers with composition, integration and differentiable operators.

Diaconescu, R., Simion Stoilow Institute, Romania, 8.11.99 - 12.11.99. *Lecture*: Grothendieck institutions.

Goguen, J., University of California at S. Diego, USA 1.9.99 - 3.9.99. *Lecture*: Recent results in hidden algebra.

Moore, C., Santa Fe Institute, USA, 15.11.99 - 20.11.99. *Lecture*: Quantum computation and quantum circuits.

Neto, J., Faculdade de Ciências da Universidade de Lisboa and University of S. Paulo, Brazil, 3.12.99. *Lecture*: Computação simbólica com redes neuronais modulares.

Nunes, I., Faculdade de Ciências da Universidade de Lisboa, Portugal, 26.3.99. *Lecture*: Semântica de programas comportamentais.

Petros Stefaneas, N T U Athens, Greece, 8.11.99 - 12.11.99.

Pinto, J., Catholic University of Chile, Chile, 18.7.99 - 31.7.99. *Lecture*: Concurrency and action interaction in the situation calculus, 30.7.99.

Schroeder, L., University of Bremen, Germany, 12.7.99 - 16.7.99. *Lecture*: Equivalence functors between composition graphs, 16.7.99.

Tarlecki, A., University of Warsaw, Poland, 31.5.99 - 4.6.99. *Lecture:* Institutional bits and pieces, 4.6.99.

Vasconcelos, V., Faculdade de Ciências da Universidade de Lisboa, Portugal, 22.1.99. *Lecture:* O cálculo-lambda com passagem por valor num cenário concorrente.

Vickers, S., Imperial College, London, UK, 5.7.99 - 9.7.99. *Lecture:* Topical categories of domains, 9.7.99.

Viganò, L., University of Freiburg, Germany, 27.9.99 - 6.10.99. *Lecture:* Labelled non-classical logics and their encoding in Isabelle, Advanced Course 27.9.99-01.10.99.

Wolter, F., University of Leipzig, Germany, 3.5.99 - 7.5.99. *Lecture:* Fragments of nodal and Temporal predicate logics, 7.5.99.

Zakharyashev, M., University of Moscow, Russia, 3.5.99 - 7.5.99. *Lecture:* Fragments of nodal and temporal predicate logics, 7.5.99.

Zanardo, A., University of Padova, Italy, 1.9.99 - 3.9.99. *Lecture:* Individual concepts and substances in first-order temporal logic, 3.9.99.

5. Post-Doc's

Algebra and Mathematical Analysis

Stephen Lillywhite, University of Maryland, USA, Center for Mathematical Analysis, Geometry and Dynamical Systems.

Benoît Saussol, Université de Toulon et du Var, France, Center for Mathematical Analysis, Geometry and Dynamical Systems.

Sergei Anisov, Independent University of Moscow, Center for Mathematical Analysis, Geometry and Dynamical Systems.

Yong Hoi Koo, University of Minnesota, Center for Mathematical Analysis, Geometry and Dynamical Systems.

Computer Science

Hermida, C., Postdoctoral Research Fellow, since 2.12.99.

6. Research Programmes and Sponsorship

6.1 Research Units

The members of the Department participate in research units that receive grants under the “Financiamento Plurianual e Programático”, FCT-MCT:

- Applied Mathematics Center, n° 82/96, coordinated by A. Ferreira dos Santos, with the following research groups:

1. Operator Theory, Integral Equations and Applications, Coordinated by A. Ferreira dos Santos.
2. Numerical Analysis and Applications in Fluid Mechanics, Coordinated by Adélia Sequeira.
3. Statistics, Stochastic Processes and Applications, Coordinated by João A. Branco.
4. Mathematical Physics, Coordinated by Roger Picken.
5. Logic and Computation, Coordinated by Amílcar Sernadas.

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

- Center for Mathematical Analysis, Dynamical Systems and Applications, n° 89/96, coordinated by C. Rocha.

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

- Institute for Systems and Robotics at Lisbon, n° 101/96, coordinated by J. Sentieiro (Department of Electrical Engineering and Computers)

URL: <http://fire.ist.utl.pt/isr/>

- Center for Plasma Physics, n° 90 B/96, coordinated by José Tito Mendonça (Complexo Interdisciplinar)
- Research Unit for Naval Engineering and Technology, n° 134/96, coordinated by Carlos Guedes Soares (Section of Naval Engineering)
- Research Line 3 - Queueing Systems and Quality Management - in the UETN (Marine Technology and Engineering Unit, coordinated by Fernanda Ramalhoto

6.2 Research Projects Coordinated by Department Members

Branco, J. A., Coordinated the research project:

- Análise e Implementação Computacional em Estatística Aplicada, PRAXIS/PCEX/P/MAT/41/96.

Canas da Silva, A., Coordinated the research project:

- Geometry and Topology of Moduli Spaces, PRAXIS XXI Project PCEX/C/MAT/44/96, January 1998 - June 2000.

Carmo, J., Portuguese coordinator of the research project:

- Modeling organizations and normative interaction, Acção Integrada Luso-Britânica N° 8-33/99 in cooperation with Imperial College: 1999-2000.

Cordovil, R., Coordinated the research project:

- Variedades Diferenciais Combinatoriais e Discretas, PRAXIS XXI Project PCEX/C/MAT/39/96.

dos Santos, A. F., Coordinated the research project:

- Factorização de Operadores e Aplicações à Física-Matemática, PRAXIS XXI Project 2/2.1/MAT/441/94 (1996-2000).

Freitas, P., Coordinated the research project:

- Teoria Qualitativa de Equações Funcionais e Sistemas de Equações Funcionais e Sistemas de Equações às Derivadas Parciais, PRAXIS XXI Project PCEX/P/MAT/36/96.

Ramalhoto, M. F., Coordinated the research project:

- Advances in Retrial Queueing Theory, INTAS 96-0828, (1997-2000).

Resende, P., Portuguese Coordinator of the following project:

- Dynamic Observational Logic, Acção Integrada Luso-Britânica N° B-29/99 in cooperation with Imperial College: 1998-2000.

Sequeira, A., Coordinated the projects:

- Mathematical and Numerical Analysis of Non-Linear Problems in Mechanics and Physics, in collaboration with CMAF/UL and CMAP École Polytechnique, Palaiseau, France, ICCTI/CNRS.
- Numerical Methods in Fluid Mechanics, in collaboration with École Polytechnique, La Marsa, Tunisia, ICCTI/Tunisia.
- Numerical Simulation of Direct and Inverse Problems in Wave Propagation and in Fluid Flows, in collaboration with ENIT/LAMSIN, Tunis, Tunisia, ICCTI/Tunisia.
- Mathematical Analysis and Numerical Simulation of Non-Newtonian Fluids with Applications in Liquid-Crystalline Polymers, PRAXIS XXI Project 2/2.1/MAT/380/94.

Sernadas, A., Coordinated the projects:

- ACL: Algebraic Combination of Logics
PRAXIS XXI Project PCEX/P/MAT/46/96: 97-99.
- ProbLog: Probabilistic Methods in Logic of Reactive Systems
PRAXIS XXI Project PRAXIS/P/MAT/10002/1998: Mar99-May01

Speck, F.-O., Coordinated the following project:

- Spline-Galerkin Methods for Integral Equations of Wiener-Hopf Type, in collaboration with the Technische Universität Chemnitz, JNICT and BMFT (the Federal Minister for Research and Technology in Germany), 1995-99.

Videman, J., coordinated the Research Project:

- Regularity and Asymptotics for Non-Newtonian and Viscoelastic Fluids, in collaboration with the Institut für Angewandte Mathematik der Universität Bonn, Germany, ICCTI/INIDA 423/DAAD.

6.3 Participation in Other Research Projects

Some members of the Department also received research funding through projects coordinated outside the Department:

Bastos, M. A., Câmara, M. C. and Teixeira, F. S.

- Operator Factorization and Applications to Mathematical Physics, PRAXIS XXI 1996/99.

Carmo, J., participated in:

- PRAXIS XXI Project 2/2.1/TIT/1662/95 - SARA: Society of Animated and Responsible Agents.

Florentino, C., participated in:

- Acções integradas Luso-Espanholas with the University of Salamanca, Spain.

Graça, M. M., Member of the IDMEC (Instituto de Mecânica), since January 1998, Centro de Projecto Mecânico, coordinated by Carlos Mota Soares.

Gouveia, P., participated in

- PRAXIS XXI Project PRAXIS/P/EEI/11249/1998 - QUEST: Quintessential Algorithms for Satisfiability and Optimization.

Picken, R. F., participated in:

- Functional Analysis and Quantum Field Theory, PRAXIS/2/2.1/FIS/286/94, coordinated by José Mourão (Dept of Physics, IST)
- Mathematical Physics, PRAXIS/P/MAT/10028/98, coordinated by Ana Bela Cruzeiro (Faculdade de Ciências, Univ. of Lisbon)

Ramalhoto, M. F., participated in:

- Two Research Programmes of the European Union Fifth Framework as an Applied Probability and Statistics Expert.
- European Network for Business and Industrial Statistics as an Executive Committee Member.

Romeiras, F. J.

- Plasmas Espaciais Não Girotrópicos, PRAXIS XXI Project 2/2.1/FIS/435/94, coordinated by Brinca, A. L. (Departamento de Engenharia Electrotécnica e de Computadores, IST).

Saussol, B. participated in:

- Probabilistic methods in non hyperbolic dynamics, Program of the European Science Foundation, 1998-2003.

Sequeira, A., participated in:

- Applied Mathematics for Industrial Flow Problems AMIF, Project of the European Science Foundation.

Sernadas, A., Sernadas, C., Resende, P., Gouveia, P., Ramos, J., Caleiro, C., Ravara, A., participated in

- ESPRIT IV Working Group 22, 04 ASPIRE: "Advanced modeling and SPecification of distributed InfoRmation systEms".

Sernadas, A., Sernadas, C., Dionísio, F.-M., Caleiro, C., participated in

- ESPRIT IV Working Group 23531 FIREworks: "Feature Integration in Requirements Engineering".

Sernadas, A., Sernadas, C., Resende, P., Gouveia, P., Ravara, A., participated in

- PRAXIS XXI Project 2/2.1/TIT/1658/95 LogComp: "LOGic and COMPutation".

7. Organization of Conferences, Meetings, etc.

Abreu, M., Member of the Organizing Committee of the Omega'99 - Conference on Symplectic Geometry, Lisbon, Portugal, 21.6.99 - 26.6.99.

Alves, C. J. S., Member of the Organizing Committee of the Thematic Trimester on Theoretical and Computational Fluid Dynamics, Lisbon and Coimbra, May-July 1999.

Barreira, L., Co-organizer of the Smooth Ergodic Theory Workshop, 29.3.99 - 31.3.99.

Branco, J. A., Chairman of the VII Congresso Anual da SPE, Ofir, Portugal, 14.10.99 - 16.10.99.

Cannas da Silva, A., Organizer of the Conference Omega'99 - Conference on Symplectic Geometry, Lisbon, Portugal, 21.6.99 - 26.6.99.

Duarte, P. M., Co-organizer of the Smooth Ergodic Theory Workshop, 29.3.99 - 31.3.99.

Fernandes, R. L., Co-organizer of the Smooth Ergodic Theory Workshop, 29.3.99 - 31.3.99.

Freitas, P., Co-organizer of the conference on Functional Difference and Differential Equations, Lisbon, Portugal, July 1999.

Florentino, C., Co-organizer of the summer school: School on Singularities in Algebraic Geometry and String Theory, Complexo II of University of Lisbon, Lisbon, Portugal, 8.07.99 - 17.07.99.

Matias, J., Member of the Organizing Committee of the New Trends in the Calculus of Variations, Lisbon, Portugal, October 1999.

Matos, J. P., Member of the Organizing Committee of the New Trends in the Calculus of Variations, Lisbon, Portugal, October 1999.

Nunes, J. P., Co-organizer of the:

- School on Singularities in Algebraic Geometry and Physics, Complexo II, Universidade de Lisboa, Portugal, 8.7.99 - 17.7.99.
- Conference on Symplectic Geometry (Omega 99), IST, Lisbon, Portugal, 21.6.99-26.6.99.
- First IST Lectures in Algebraic Geometry and Physics, Mathematics Department of the IST, Lisbon, Portugal, 8.2.99 - 11.2.99.

Paulino, C. D., Organizer and Co-organizer of :

- Workshop on misclassification and missing information in categorical data, IST, Lisbon, Portugal, 20.10.99 - 21.10.99.
- Short course on Bayesian Statistics, FCUL and IST, Lisbon, Portugal, 01.02.99-04.02.99.

Picken, R., Member of the organizing committee of the VIIIth Oporto Meeting on Geometry, Topology and Physics, Oporto, Portugal, 2.7.99 - 5.7.99.

Ramalhoto, M. F., Member of the

- Scientific Committee of the International Conference, Modern Mathematical Methods of Investigating the Telecommunicational Networks, Minsk, Belarus, 22.6.99 - 24.6.99.
- IX International Symposium on Applied Stochastic Models and Data Analysis, ASMDA99 Lisbon, Portugal, 14.6.99 - 17.6.99.

Ramalhoto, M. F., Chairperson of the:

- Session 9, Statistical Process Control of the First International Symposium on Industrial Statistics, Linchöping, Sweden, 19.8.99 - 21.8.99.
- Session 13, Multivariate Statistical Process Control of the First International Symposium on Industrial Statistics, Linchöping, Sweden, 19.8.99 - 21.8.99.

Ramalhoto, M. F., Co-Chairperson of the Session, Maintenance of the ESREL'99 Conference, Munich, Germany, 13.9.99 - 17.9.99.

Ravara, A., Co-organizer of the 2nd International Workshop on Semantics of Objects as Processes (SOAP), Satellite Event of ECOOP'99, Lisbon, Portugal, 17.07.99.

Rocha, C., Co-organizer with Amann, H. and Rodrigues, J. F. of the Workshop on Nonlinear Parabolic Problems, Nonlinear Partial Differential Equations, Centro de Matemática e Aplicações Fundamentais da UL and Centro de Análise Matemática, Geometria e Sistemas Dinâmicos do IST, Lisbon, Portugal, 13.05.99 - 16.05.99.

Sequeira, A., Chairman of the Thematic Term:

- Theoretical and Computational Fluid Dynamics (C.I.M./Fundação Calouste Gulbenkian, Portugal May, June and July, 1999). The Thematic term included Seminars, Mini-Symposia at C.I.M. (Observatório Astronómico da Universidade de Coimbra) and the following Summer Schools:
Industrial Mathematics (IST, Lisbon, June 7-12, 1999) -Coordinators: A. M. Anile (Univ. Catania, Italia) and A. Fasano (Univ. Firenze, Italia);
Navier-Stokes Equations and Related Topics (IST, Lisbon, June 28 - July 3, 1999) - Coordinator: H. Beirão da Veiga (Univ. Pisa, Italia);
Computational Fluid Dynamics (C.I.M., Coimbra, July 12-17, 1999) - Coordinator: A. Quarteroni (EPFL, Lausanne, Switzerland).

Sequeira, A., Member of the Organizing and or Scientific Committee of :

- International Conference on Partial Differential Equations and Applications - in honor of the 70th. birthday of Prof. J. Necas, Olomouc, Czech Republic, 13.12.99 - 17.12.99.
- Seventh International Conference on Navier-Stokes Equations and Related Nonlinear Problems, Ferrara, Italia, 14.9.99 - 18.9.99.

- Workshop on Theoretical Fluid Dynamics and Related Topics, Lisbon, Portugal, June 16.6.99 - 19.6.99, Thematic Semester of CMAF/UL Nonlinear Partial Differential Equations and Applications, March-October, 1999.
- International Conference on Differential Equations, Numerical Analysis and Nonlinear Mechanics - in honor of the 75th. birthday of Prof. V. Lakshmikantham, University of Central Florida, Orlando, U.S.A., 17.3.99 - 19.3.99.

Sernadas, A., Member of the Program Committee:

- CAISE99: 11th Conference on Advanced Information Systems Engineering, Heidelberg, Germany, 14.6.99 - 18.6.99.
- LICS99, Trento, Italy, 2.7.99 - 10.7.99.
- 10th Conference on Data Base and Expert Systems Applications, Florence, Italy, 30.8.99 - 3.9.99.

Videman, J. H., Member of the Organizing Committee of the Thematic Term on Theoretical and Computational Fluid Mechanics, Coimbra/Lisbon, Portugal, May-July, 1999.

8. Personal Notes

A Honours and Prizes

Resende, P., Received the "Prémio Científico IBM 1998" awarded by IBM Portuguesa, October 1999.

B New Professors and Promotions

Barreira, L., Professor Associado

Costa, J., Professor Associado

Freitas, P., Professor Associado

C Other Degrees Supervised by Members of the Department

Pires, A. M., Supervisor of the Master thesis, "Métodos não paramétricos em Análise Discriminante", (Soares, R.), Instituto Superior de Economia e Gestão, Universidade Técnica de Lisboa, Portugal, 28.1.98.

Sequeira, A., Supervisor of the thesis, "Implémentation de deux méthodes d'éléments finis pour la résolution d'un problème de Stokes et d'un problème de transport associés au modèle d'écoulement d'un fluide non-Newtonien" (Pereira, P.), Maótrise d'IUP de Mathématiques Appliquées et Industrielles, Université de Grenoble I, France, (estágio no DM/IST, program SOCRATES-ERASMUS, 1.4.99 - 6.9.99).

D Other Notes

Abreu, M., Canas da Silva, A. Fernandes, R. L. and Nunes, J. P., Organizers of the Conference on Symplectic Geometry, to be held in Lisbon, Portugal, June 1999.

Alves, C. J. S.,

- Member of the Scientific Committee of the International Symposium on Inverse Problems on Engineering Mechanics, to be held in Nagano, Japan, March 7-10, 2000.
- Participation on the European Inverse Problems Consortium.

Barreira, L., Member of the Editorial Board of Dynamics and Stability of Systems. 2000-.

Branco, J. A., Chairman of the Portuguese Statistics Society.

Cannas da Silva, A., Organizer of the Seminar Geometry in Lisbon, Lisbon, Portugal, October 1999.

Carmo, J., Member of the Program Committee of the Fifth International Workshop on Deontic Logic in Computer Science, Toulouse, France. 20.1.00 - 22.1.00.

Florentino, C.:

- Organizer of the Working Seminar on Algebraic Geometry, Mathematics Department, IST, Lisbon, Portugal.
- Co-organizer of the First IST Lectures on Algebraic Geometry and Physics to Algebraic Geometry and String Theory, Lisbon, I.S.T, Portugal, 8.2.99 - 11.2.99.

Picken, R.:

- Member of the organizing committee of the International Workshop on Operator Theory and Applications IWOTA-Portugal 2000, Faro, Portugal, 12.09.00 - 15.09.00.
- Member of the organizing committee of the IXth Oporto Meeting on Geometry, Topology and Physics, Oporto, Portugal, 29.9.00 - 2.10.00.

Pinto, P., Participated in Workshop of the Modular Invariants, Operator Algebras and Quotient Singularities, Warwick University, 20.9.99 - 25.9.99.

Ramalhoto, M. F.:

- Member of the Scientific Committee ("Arguente") for the "Agregação" award in the area of Stochastics in Mining Engineering, IST -Department of Mining Engineering.
- Member of the Scientific Committee for Associate Professorship award, Computer science, IST, Department of Mathematics.
- Member of the Editorial Board Committee of the European Periodical EJEE.
- Reviewer for the International Statistical Institute, Short Book Reviews.
- Member of the Scientific Programme Committee of the Third Workshop on Advanced Retrieval Queues, Amsterdam, Holland, 13.3.00 - 15.3.00.

Resende, P., Postdoctoral fellow at the Department of Algebra and Geometry of Masaryk University, Brno, Czech Republic, 1.9.99 - 21.12.99.

Rocha, C., Member of the Scientific Committee and Co-organizer with Costa, F. P., Fernandes, R. L. and Henriques, P. G., of the Conference on Differential Equations and Dynamical Systems in honor of Waldyr Oliva, Center for Mathematical Analysis, Geometry and Dynamical Systems of IST, to be held in Lisbon, Portugal, 26.06.00 - 30.06.00.

dos Santos, A. F., Coordinator of the organizing Committee of the Conference IWOTA, Faro, Portugal, September 2000.

Sequeira, A.:

- Invited Professor at the University of Pau, France (Lab. de Math. Appliquées), March 2000.
- Invited Lecture at International Conference on Topics in Mathematical Fluid Mechanics - dedicated to the 60th. birthday of Prof. J. Heywood, Capo Miseno, Italia, 27.5.00 - 30.5.00.

- Invited Lecture at the third WCNA - Minisymposium on Navier-Stokes Equations: Stability, Approximation Methods and Artificial Boundary Conditions, Catania, Italy, 19.7.00 - 26.7.00.
- Invited lectures at the workshop on "Non-Newtonian and Viscoelastic Fluids", Scuola Normale Superiore di Pisa, Italy, 16.10.00 - 17.10.00.
- Invited Lecture 16th. IMACS World Congress 2000 - Session on Applied Mathematics for Industrial Flows, EPFL, Lausanne, Switzerland, 21.8.00 - 25.8.00.
- Member of the Scientific Committee: Second International Conference on Applied Mathematics for Industrial Flow Problems - AMIF/ESF, Il Ciocco, Toscana, Italia, 12.10.00 - 14.10.00.
- Proceedings: International Conference on Partial Differential Equations and Applications - in honor of the 70th. birthday of Prof. J. Necas, Olomouc, Czech Republic, 13.12.99 - 17.12.99, (Pokorny, M., Matusu-Necasova, S. and Sequeira, A. Eds.), Czech Journal Matematika Bohemica, Vol. 1, 2001.
- Member of the Organizing Committee: International Conference on Contemporary Challenges in Applied Fluid Mechanics, Capri, Italia - May, 2001.

Sernadas, A., Member of the Program Committee of CAISE2000: 12th Conference on Advanced Information Systems Engineering, Stockholm, Sweden, 5.6.2000 - 9.6.2000.

Speck, F.-O.:

- Member of the jury of the agregação of Viktor G. Kravchenko (Universidade do Algarve), IST, Lisbon, Portugal, 18.10.99 - 19.10.99.
- Member of the Scientific Committee of the International Workshop on Direct and Inverse Wave Scattering, Geze, Kocaeli, Turkey, 27.9.99 - 1.10.99.
- Coordinator of the Colloquium on Applied Mathematics, founded by the Applied Mathematics Centre in November 1999.
- Member of the Organizing Committee of the International Workshop on Operator Theory and Applications, to be held in Faro, Portugal, 12.9.00 - 15.9.00.

PREPRINT SERIES**1999**

- 1/99 BASTOS, M.A., KARLOVICH, Iu.I., SANTOS, A.F.: Oscillatory Riemann-Hilbert problems and the corona theorem. 49pp.
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- 45/99 CÂMARA, C.; dos SANTOS, A.F.; MANOJLOVIC, N.: Generalized factorization for $N \times N$ Daniele-Khrapkov matrix functions. 22pp.

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