

CMAF-CIO: Scientific Report 2016

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Introduction

After a lower profile activity in 2015 due to budget restrictions, the Center has regained momentum after its reevaluation with updated funding. In 2016 there was an increased number of missions and visitors, participation in international scientific events, launching calls for post-doctoral and graduate positions. Here is a quick glance at some numbers:

Visitors in 2016.....	32
Post-doctoral positions	9*
Investigador FCT positions.....	4**
Master grant positions.....	4
Undergraduate grant positions.....	2
Science managing positions.....	2
PhD theses completed	1***
PhD theses in progress.....	15***
Conferences organized	19***
Articles published in refereed journals....	73***
Invited talks by members.....	89***

* Current post-doctoral positions (as of March 2017):

- Differential Equations / Dynamical Systems: Paolo Gidoni
- Biomathematics: epidemiology: Peyman Ghaffari
- Geometry and Geometric Analysis: Áurea Quintino; Daniel Ramos
- Continuous and discrete time functional equations: Cristina Serpa
- Mathematical Logic: Ezgi Iraz Su; Emanuele Frittaion
- Partial Differential Equations: Riccardo Scala
- Geometry: Azizeh Nozad

** Nicolas Van Gothem (Nonlinear PDEs), Alexander Usvyatsov (Math. Logic), Nikolaus Stollenwerk (Biomath) and Pedro Castro (Oper. Research).

*** Details can be found in the final sections of this report. Information is also available in our webpage <http://cmafcio.ciencias.ulisboa.pt>

The funding has been used mainly to support grants, missions, consultants (including the organization of events and seminars), renewal of equipment, a substantial contribution to the mathematical library at FCUL and outreach actions.

The renewal of the team is an important issue that we have tried to partially achieve via the calls for post-doctoral fellows and for students at an early stage of their research. Another concern is that the number of doctoral students in some areas is lower than the unit might host but the ways to handle that situation are quite limited.

A List of Scientific Achievements by Research Area

Partial Differential Equations and Applications

Considering the Cauchy problem for the non-linear Schrödinger equation, new functional spaces are introduced for which the initial value problem is well-posed. These spaces, based on the concept of spatial plane wave, contain H^1 but not L^2 . Results on existence and stability are proved. The same ideas are applied to the 3-dimensional Navier-Stokes equation over the full space.

(M. Figueira, S. Correia)

For the analysis of plasticity based on the incompatibility of the elastic deformations and the dislocation lines, two papers have been published on the analytic study of a fourth order tensor operator and on the formalism of cartesian currents applied to a variational problem in non-linear elasticity.

(N. Van Goethem)

Study of the Cauchy problem for a coupled system of the Schrödinger equation with a conservation law with non-local non-linearity. Study of the Cauchy problem and of solitary waves for a coupled system of the Ginzburg-Landau equation with a quasilinear hyperbolic equation.

(J.P. Dias, F. Oliveira, H. Tavares)

Anisotropic equations of Navier-Stokes type with indices of non-linearity in different spatial directions have been studied. Existence of solutions for initial and boundary value problems and their comparison with the isotropic case (when all the indices are equal) have been investigated. We showed that, for some proportions among indices, the minimal index supplying the existence of solutions for the problem can be smaller than the isotropic one.

(S. Antontsev, H. Oliveira)

The relaxation of a functional related to a problem of optimal design with perimeter penalization under non-standard growth conditions.

(A.C. Barroso)

Numerical study of structures with symmetries (which allow decreased computational complexity). Coding in the FEniCS language of the finite elements method for periodic problems, and generalization to three-dimensional problems.

(C. Barbarosie, Sérgio Lopes, A.-M. Toader)

Generalization of the adjoint method for minimization of functionals depending on eigenvalues and eigenvectors, namely on the traces of eigenvectors in parts of the outer frontier of a body. Development of an inverse method for detecting the shape of hidden inclusions inside a body based on the eigenvalues and eigenvectors of the body.

(A.-M. Toader, C. Barbarosie)

An obstacle problem with constraints of mass for a multidimensional conservation law, where the existence of an entropic solution through a method of penalization/viscosity has been proved.

(J.F. Rodrigues)

Existence of Lipschitzian or continuous solutions with bounded variation for evolution problems with variable domains in Hilbert spaces.

(Manuel Marques)

New function spaces, containing Hölder spaces, also applicable to partial differential equations have been introduced. Study of sufficient conditions for global regularity of Navier-Stokes equations.

(H. Beirão da Veiga)

Profile-preserving distributional solutions of the non-linear Klein-Gordon equation have been studied, together, and under the same point of view, with the so-called “phi-four equation” and “sine-Gordon equation”.

(C. Sarrico)

Non-stationarity of a time series as a result of time variation of parameters in the variable distribution. These parameters obey a stochastic differential equation yielding the drift and the diffusion coefficient of that equation. Application of this methodology to the time series of the empirical distribution of capitalizations, extracted every 10 minutes, from the New York Stock Exchange.

(J.P. Boto, P. Rocha)

Research in the History of Mathematics with relevance to the preparation of two articles on the history of the Portuguese Mathematics in the XX century; also, edition of three proceedings of international events in the same area, and a book on history of science to be edited by Fundação Calouste Gulbenkian.

(L. Saraiva)

Operations Research

At the time of the formation of CMAF-CIO, the OR group established guidelines to maintain a "relevant and excellent" position in the area of OR, focusing on Discrete Optimization without discarding the emerging areas and supervision of PhD and master students. Side by side with research with strong theoretical interest (although motivated by real world applications) the group keeps strengthening connections with society.

Recent work can be classified under the following items:

1. Routing - under the project RORNET, development of ILP models for

i) node routing problems (Luís Gouveia, Ana Paias, Marta Mesquita, Raquel Bernardino (Phd Student) and Daniel Santos (PhD student)) including the family travelling salesman problem, the travelling salesman problem with precedence constraints, pick-up and delivery variants, multi-depot variants of the travelling salesman problem, the TSP with selective cities (arising in fishery surveys sampling operations and motivated by IPMA) , or

ii) arc routing problems including: I) (Candida Mourão, Miguel Constantino, Ana Catarina Nunes e Maria João Cortinhal) a variant with dissimilar routes (motivated and suggested by EMEL for preventing the likelihood of robberies) and the sectoring arc routing problem (motivated by a previous study from the Municipality of Seixal on waste pick up routing)

2. Stochastic (Francisco Saldanha da Gama) - Optimization models and solution techniques for strategic and operational logistics network design problems under uncertainty (in demand levels, in production capacity, in distribution costs, etc.) with emphasis on facility location and hub location problems.

3. Health care - Establishing links with applications in several hospitals (Eugénia Captivo and Inês Marques:) approaches to elective surgeries planning and scheduling in public and private hospitals. Robust approach, taking into account the uncertainty associated with the duration of the surgeries, was developed and computationally tested. Assignment and reallocation of ambulances (initial stage) for INEM. (Maria Luisa Respício, Margarida Pato and Margarida Moz:) New multi-skill staffing method and its application in a Brazilian hospital.

Other projects with societal impact include sectors as defense and transport.

4. Industry (Pedro Castro): mathematical programming models for the optimal scheduling of industrial plants. Mixed-integer nonlinear problems (MINLP) dealing with crude oil blending in petroleum refineries and mixed-integer linear problems (MILP) for the transportation of refined products by pipeline. Global optimization algorithm for a class of non-convex MINLPs integrating spatial branch-and-bound and a MILP relaxation from multi-parametric disaggregation.

5. Other - These are loose topics, some strongly related with applications, see i), some related with telecommunications (see ii), iii) and iv)) , some have a strong link with graph theory (e.g., iv)), some are related with logistics (e.g., v) and vi)).

i) (Isabel Martins and Miguel Constantino): models for forest management with environmental constraints,

ii) (Pedro Patrício and Luis Gouveia), maximization of protected demand in telecommunication networks using partial disjoint paths,

iii) (Luis Gouveia) mathematical programming formulations and exact methods for the design of networks with single-path routing, namely the one imposed by the Multiple Spanning Tree Protocol,

iv) (Luis Gouveia) design on networks with vulnerability constraints,

v) (Maria Teresa Melo and Maria João Cortinhal) design of a multi-echelon logistics network with transportation mode selection and outsourcing opportunities

vi) (Pedro Martins) integrated approaches for lot-sizing problems together with workforce and income and outcome cash-flows in each period.

Geometry

The relative reconstruction functor $RH^\wedge$ was introduced, revealing to be, as expected, an equivalence of categories for mixed twistor D-modules (to be published in 2017). (M.T. Fernandes)

The research on variational theories and geodesic interpolation was pursued.

Classification of hypersurfaces on the unit sphere admitting totally geodesic foliations of codimension 1. New results on Wilmore surfaces with constraints were obtained, and the research on local rigid systems and limits of tangents was pursued. (A. Quintino)

Construction of the equisingular versal deformation of a Legendrian curve, and of the moduli space of a Legendrian curve with prescribed topological type. (O. Neto)

Two new papers have been submitted:

- L. Fiorot, T.M. Fernandes; “t-structures for relative D-modules and t-exactness of the de Rham functor”. arXiv:1703.09319
- T.M. Fernandes, C. Sabbah; “Riemann-Hilbert correspondence in dimension one”. arXiv:1704.05102

Ordinary Differential Equations and Dynamical Systems

Large deviation for singular quasi-periodic analytic cocycles and consequences in continuity, simplicity and positivity of the Lyapunov exponents.

An hyperbolicity theorem for contractive billiards in polytopes with arbitrary dimension. (P. Duarte)

Permanence criteria for a family of non-autonomous delayed differential equations. Existence of a positive periodic solution to periodic systems. Application to Nicholson type systems. (T. Faria)

Applications in Epidemiology: travelling waves in a SI type problem; heterogeneity in disease risk induces falling vaccine protection with rising disease incidence
(A. Margheri and C. Rebelo)

Kepler’s problem with drag. (A. Margheri and C. Rebelo)

Generalized periodic solutions in a Kepler type problem. (C. Rebelo and A. Simões)

Development of a unified, constructive approach to the problem of propagation of regularity for positive definite kernels and functions and the development of constructive solutions for systems of iterative functional equations (J. Buescu)

Solutions of Dirichlet and homoclinic type for 2nd order ODEs with space singularities of power type. (L. Sanchez)

Stochastic Analysis, Mathematical Physics and Applications

- The investigation of new functional inequalities for the well-known Kac's Walk. The 'Almost' Cercignani conjecture on the energy where is largely resolved. A new notion of chaoticity plays an essential role. The results obtained validate Kac's suggestion that functional inequalities for the Kac walk could be used to quantify the rate of approach to equilibrium for the Kac-Boltzmann equation. (M. C. Carvalho with E. Carlen and A. Einav) (1 paper submitted to Annals of Prob. Theory now under revision)
- The study of chaos, propagation of chaos, and relaxation to equilibrium in a quantum version of the Kac Model, a model proposed by Kac in 1956 to study convergence to equilibrium for the Boltzmann equation through convergence to equilibrium for a Master equation, computing the exact spectral gap as a function of the size of the system. (M. C. Carvalho with E. Carlen and M. Loss) (1 paper to be submitted in 2017)
- Presentation of a rigidity theorem for isometric immersions from Kähler manifolds into a quaternionic projective space (or its non compact real form), when its nullity index is everywhere positive (M. J. Ferreira and B. Simões with R. Tribuzy) (1 paper already published)
- The study of the chaos decomposition of self-intersection local times and their regularization, with a particular view towards Varadhan's renormalization for the planar Edwards model. (M. J. Oliveira with J. Bornaes and L. Streit) (1 paper already published)
- Construction of a general framework for graph signal transforms, exploring generalizations of the Fourier transform on graphs. A general class of transforms is constructed, including wavelet-like transforms on graphs. Graph tomogram transforms are also constructed. (R. Vilela Mendes with Hugo Mendes and T. Araujo) (1 paper already published)
- Stabilizing, by deformation, the algebra of relativistic quantum mechanics a non commutative space time geometry is obtained. The exterior algebra of this geometry leads to an extended massless Dirac equation which has both a massless and a large mass solution. The nature of the solutions is discussed as well as the effects of coupling the two solutions. (R. Vilela Mendes) (1 paper already published)
- Stochastic solutions provide new rigorous results for nonlinear PDE's and, through its local non-grid nature, are a natural tool for parallel computation. There are two different approaches for the construction of stochastic solutions: McKean's and superprocesses. In favour of superprocesses is the fact that they handle arbitrary boundary conditions. However, when restricted to measures, superprocesses can only be used to generate solutions for a limited class of nonlinear PDE's. A new class of superprocesses, namely superprocesses on ultradistributions, is proposed to extend the stochastic solution approach to a wider class of PDE's. (R. Vilela Mendes) (1 paper already published)
- Analytical study of growth estimates, control of fluctuations, and conservative structures in a two-field model of the scrape-off layer (R. Vilela Mendes) (1 paper already published)
- The construction of a consistent measure for Yang–Mills is a precondition for an accurate formulation of non perturbative approaches to QCD, both analytical and numerical. Using projective limits as subsets of Cartesian products of homomorphisms from a lattice to the structure group, a consistent interaction measure and an infinite-dimensional calculus has been constructed for a theory of non-Abelian generalized connections on a hypercubic lattice. New results are obtained for the mass gap when the structure group is compact. (R. Vilela Mendes) (1 paper already published)

Mathematical Logic

The research in the Mathematical Logic group has focused traditionally in Proof Theory (F. Ferreira, G. Ferreira and the post-doc Bruno Dinis) and Model Theory (M. Edmundo and A. Usvyatsov). With the integration of three new members (A. Sernadas, C. Sernadas and J. Rasga) the activity of the group widened and now includes the topic of combination logics, in the interface between Applied Logic and Proof Theory.

In Proof Theory, F. Ferreira continued his work on Functional Interpretations that enjoy a certain monotonicity property on the existential variables of the interpreting formula (let us call these interpretations, functional M-interpretations). F. Ferreira submitted a paper for the forthcoming volume "Feferman on Foundations" in which a functional M-interpretation for intuitionistic Kripke-Platek (KP) set theory is studied. The results include interpretations of second-order KP (namely, interpretations of strict Π^1_1 -reflection) and an application to the (classical) version of KP with the power set operation (obtaining results of M. Rathjen). Herbrand interpretations (i.e., M-interpretations in which existential witnesses are collected into finite sets) were also a subject of attention. With B. Dinis, the combinatorial core of Herbrand interpretations was isolated and applications to weak König's lemma were made. With G. Ferreira, an Herbrand interpretation was used to analyze anew classical predicate logic (with a new proof of Herbrand's theorem). In a different direction of Proof Theory, G. Ferreira also explored some features of so-called atomic polymorphism (namely, applications to the disjunction property in its Rasiowa-Harrop formulation, and a characterization of the representable functions of atomic polymorphism).

In Applied Logic/Proof Theory, A. Sernadas (unfortunately, recently deceased), C. Sernadas and J. Rasga studied preservation of admissibility by meet-combination logics and described a basis for admissible rules from bases for the components logics. Structural completeness and decidability were shown to be preserved.

M. Edmundo studied the fundamental group of a definable compact group in an arbitrary o-minimal structure. The purpose of this study was to show that this fundamental group is intrinsic (it does not depend on how it is presented as embedded in a cartesian product of group-intervals). The conditions for obtaining the formalism of the six Grothendieck operations in linear and semi-linear o-minimal structures were also studied.

A. Usvyatsov was absent in an unpaid leave most of the year. However, he kept his research on continuous structures expanding a Banach space. In a paper of 2014 with Saharon Shelah, they defended that so-called wide-types are the "correct" analogue of non-algebraic types in the context of normed structures (there is still no good candidate for an arbitrary continuous structure). Introducing wide type allowed to establish the foundations for "geometric stability theory" in the context of Banach structures. The geometry of minimal such types was investigated, and it was proved that the Morley sequences in them are isometric to the standard basis of a Hilbert space. A version of Henson's Conjecture for non-separably categorical Banach spaces was established. This result was recently submitted for publication. As a part of further applications of geometric stability to Banach space geometry, the question of obtaining an ell-p type over a given Banach structure is being investigated. A draft paper has been written and further work is in progress.

The work of the Ph.D. students is progressing. J. Enes is busy trying to devise functional interpretations of KP with finitely many admissibles in order to give new characterizations of the Sigma-ordinal of these theories (and, perhaps, to even give Π^0_2 analyses of these theories). P. Pinto is “proof-mining” a theorem of Browder with the bounded functional interpretation in order to compare it with the proof-mining via the monotone functional interpretation (this problem was suggested by U. Kohlenbach). S. Reis is working with A. Usvyatsov on generically stable types in continuous model theory and (in the context of Banach space geometry) they both plan to consider the question whether the existence of a generically stable type implies existence of an ell-p type.

Biomathematics and Statistics

The "Biomathematic and Statistics Group" has been highly active in the analysis of paradigmatic systems in population biology, analyzing vector borne infectious disease with focus in dengue fever epidemiology, where a number of novel mathematical tools are applied and developed. Multi-strain models are investigated, leading to complex dynamical behavior, including bifurcations and chaos. Stochastic versions of such models have been developed and are under statistical analysis, including parameter estimation and Bayesian analysis up to model comparison and evaluation. Prediction and predictability are now applied, especially in 2016, to evaluate control measures, like a newly developed dengue vaccine, which is highly controversial offering low efficacy and increased risk for some individuals. These results were published in high impact journals and publicized during our participation in the EU-project DENFREE, which has been terminated in the end of this year.

Further advances have been achieved in 2016 in the investigation of torus bifurcations in epidemiology and ecology, under special consideration of stochastic models leading to real world data analysis. Plenary talks on this have been given at international conferences.

As in previous years the "Biomathematic and Statistics Group" has organized in 2016 workshops and special sessions at international conferences on numerical and applied mathematics, with participation and contributions of various members of the group each. New consortia for future EU-projects are being constructed by the group.

Also in 2016, we edited a special issue of "Ecological Complexity", started the organization of the "11th European Conference on Mathematical and Theoretical Biology" ECMTB 2018, led by the "Biomathematic and Statistics Group" and to be hosted at FCUL, and, originating from our yearly lectures on Masters and PhD level, secured a book project with Taylor and Francis on a two volume book on biomathematics.

The statisticians in the group have pursued work in the areas of health, ecology and insurance. The main tools at play have been generalized linear models, simple and mixed, and time series.

A List of Papers Recently Accepted in Refereed Journals

Nonlinear PDEs and Applications

1. C. Castaing, M.D.P. Monteiro Marques, P. Raynaud De Fitte; “A Skorokhod problem governed by a closed convex moving set”. J. Convex Anal.; accepted 2016.
2. S. Amstutz, N. Van Goethem; “Incompatibility-governed elasto-plasticity for continua with dislocations”. Proc. R. Soc. Lond., Ser. A, Math. Phys. Eng. Sci.; accepted 2016.

3. N. Van Goethem; "Incompatibility-governed singularities in linear elasticity with dislocations". Math. Mech. Solids; accepted 2016.
4. M. Xavier, N. Van Goethem, A. Novotny, J.M. Faria, E. Fancello; "Topological Derivative-Based Fracture Modelling in Brittle Materials: A Phenomenological Approach". Eng. Frac. Mech; accepted 2016.
5. J. Ferreira, H.B. de Oliveira; "Parabolic reaction-diffusion systems with nonlocal coupled diffusivity terms". Discrete and Continuous Dynamical Systems - Series A; accepted 2016.
6. Ana Cristina Barroso, José Matias, Marco Morandotti, David R. Owen; "Explicit formulas for relaxed disarrangement densities arising from structured deformations". Mathematics and Mechanics of Complex Systems; accepted 2016.
7. J.P. Dias, F. Oliveira; "On a quasilinear non-local Benney system". J. Hyperbolic Diff. Eq.; accepted 2016.
8. P. Amorim, W. Neves, J.F. Rodrigues; "The obstacle-mass constraint problem for hyperbolic conservation laws. Solvability". Ann. IHP, Nonlinear Analysis; accepted 2016.
9. Paulo Rocha, Frank Raischel, João P. Boto, Pedro G. Lind; "Uncovering the evolution of nonstationary stochastic variables: The example of asset volume-price fluctuations". Phys. Rev. E; accepted 2016.
10. C.O.R. Sarrico, A. Paiva; "New distributional travelling waves for the nonlinear Klein-Gordon equation". Differential and Integral Equations; accepted 2016.
11. P.R.S. Antunes, C. Barbarosie, A.M. Toader; "Detection of holes in an elastic body based on eigenvalues and traces of eigenmodes". Journal of Computational Physics; accepted 2016.
12. S. Antontsev, Kh. Khompysh; "Kelvin-Voigt equation with p-Laplacian and damping term: Existence, uniqueness and blow-up". Mathematical Analysis and Applications; accepted 2016.
13. S. Antontsev, Rui M.P. Almeida, José C.M. Duque; "On the finite element method for a nonlocal degenerate parabolic problem". Comput. Math. Appl.; accepted 2016.
14. S. Antontsev, R.M.P. Almeida, J. Duque; "Discrete solutions for the porous medium equation with absorption and variable exponents". Mathematics and Computers in Simulation; accepted 2016.

Operations Research

1. Bernard Gendron, Luís Gouveia; "Reformulations by Discretization for Piecewise Linear Integer Multicommodity Network Flow Problems". Transportation Science; accepted 2016.
2. Bernard Fortz, Luís Gouveia, Martim Joyce-Moniz; "Optimal design of switched Ethernet networks implementing the Multiple Spanning Tree Protocol". Discrete Applied Mathematics; accepted 2016.
3. Bernard Fortz, Luís Gouveia, Martim Joyce-Moniz; "Models for the piecewise linear unsplittable multicommodity flow problems". EJOR; accepted 2016.
4. Luís Gouveia, Markus Leitner; "Design of survivable networks with vulnerability constraints". EJOR; accepted 2016.
5. R. Bernardino, A. Paia; "Metaheuristics based on decision hierarchies for the traveling purchaser problem". International Transactions in Operational Research; accepted 2016.
6. M. Albareda-Sambola, E. Fernández, F. Saldanha-da-Gama; "Heuristic solutions to the Facility Location Problem with General Bernoulli Demands". Heuristic solutions to the Facility Location Problem with General Bernoulli Demands; accepted 2016.
7. I. Correia, S. Nickel, F. Saldanha-da-Gama; "A stochastic multi-period capacitated multiple allocation hub location problem: formulation and inequalities". Omega; accepted 2016.
8. J. Castro, S. Nasini, F. Saldanha-da-Gama; "A cutting-plane approach for large-scale capacitated multi-period facility location using a specialized interior-point method". A cutting-plane approach for large-scale capacitated multi-period facility location using a specialized interior-point method; accepted 2016.

9. F. Dunke, S. Nickel, I. Heckmann, F. Saldanha-da-Gama; "Time Traps in Supply Chains: is Optimal Still Good Enough?". *European Journal of Operational Research*; accepted 2016.
10. P. Martins, E. Neves; "Corporates' control strategies using network optimization". *International Transactions in Operational Research*; accepted 2016.
11. M. Mesquita, A. Murta, A. Paias, L. Wise; "A Metaheuristic Approach to Fisheries Survey Route Planning". *International Transactions in Operational Research*; accepted 2016.
12. T. Neto, M. Constantino, I. Martins, J.P. Pedroso; "Forest harvest scheduling with clearcut and core area constraints". *Annals of Operations Research*; accepted 2016.
13. Pedro M. Castro; "Spatial Branch-and-Bound Algorithm for MIQCPs featuring Multiparametric Disaggregation". *Optimization Methods and Software*; accepted 2016.
14. Li Ting, Pedro M. Castro, Lv Zhimin; "Life Cycle Assessment and Optimization of an Iron Making System with a Combined Cycle Power Plant: a Case study from China". *Clean Technologies and Environmental Policy*; accepted 2016.
15. Hossein Mostafaei, Pedro M. Castro; "Continuous-time Scheduling Formulation for Straight Pipelines". *AIChE J.*; accepted 2016.
16. Pedro Castillo Castillo, Pedro M. Castro, Vladimir Mahalec; "Global Optimization Algorithm for Large-Scale Refinery Planning Models with Bilinear Terms". *Ind. Eng. Chem. Res.*; accepted 2016.

Geometry

1. A. Casimiro, S. Ferreira, C. Florentino; "Principal Schottky Bundles over Riemann surfaces". ; accepted 2016.
2. C. Florentino, S. Lawton, D. Ramras; "Homotopy groups of free group character varieties". *Annali Scuola Norm. Sup. Pisa, Classe di Scienze*, 17 (2017), 143–185; accepted 2016.
3. P.B. Gothen, A. Nozad; "Birationality of moduli spaces of twisted $U(p,q)$ -Higgs bundles". *Revista Matemática Complutense*, 30(1) (2017), 91–128; accepted 2016. DOI:10.1007/s13163-016-0207-0
4. T.M. Fernandes, C. Sabbah; "Riemann-Hilbert correspondence for mixed twistor D-modules". *Journal of the Institute of Mathematics of Jussieu*; subm. Sept 2016, accepted Feb 2017.

Ordinary Differential Equations and Dynamical Systems

1. A. Margheri, C. Rebelo, M.G.M. Gomes; "Heterogeneity in disease risk induces falling vaccine protection with rising disease incidence". *Dyn. Syst.*; accepted 2016.
2. A. Margheri, R. Ortega, C. Rebelo; "First integrals for the Kepler problem with linear drag". *Celestial Mechanics and Dynamical Astronomy*; accepted 2016.
3. G. Del Magno, J.L. Dias, P. Duarte, J.P. Gaivão; "Hyperbolic polygonal billiards with finitely many ergodic SRB measures". *Ergodic Theory and Dynamical Systems*; accepted 2016.
4. Cristina Serpa; Jorge Buescu; "Constructive Solutions for Systems of Iterative Functional Equations". *Constr. Approx.*; accepted 2016.
5. J. Buescu, A.C. Paixão, A. Symeonides; "Complex Positive Definite Functions on Strips". *Complex Anal. Oper. Theory*; accepted 2016.

Stochastic Analysis, Mathematical Physics And Applications

- R. V. Mendes, Superprocesses on ultradistributions, *Stochastics* <http://dx.doi.org/10.1080/17442508.2016.1269768>

Mathematical Logic

1. S. Shelah, A. Usvyatsov; “Minimal types in stable Banach spaces”. Advances in Mathematics; accepted 2016.
2. G. Ferreira; “Eta-conversions of IPC implemented in atomic F”. Logic Journal of IGPL; accepted 2016.
3. G. Ferreira; “Rasiowa-Harrop disjunction property”. Studia Logica; accepted 2016.
4. B. Dinis, F. Ferreira; “Interpreting weak König’s lemma in theories of nonstandard arithmetic”. Mathematical Logic Quarterly; accepted 2016.

Biomathematics and Statistics

1. N. Stollenwerk, P.F. Sommer, B.W. Kooi, L. Mateus, P. Ghaffari, M. Aguiar; “Hopf and torus bifurcations, torus destruction and chaos in population biology”. Ecological Complexity; accepted 2016.
2. F. Pennekamp, M.W. Adamson, O.L. Petchey, J.C. Poggiale, M. Aguiar, B.W. Kooi, D. Botkin, D.L. DeAngelis; “The practice of prediction: what can ecologists learn from applied, ecology-related fields?”. Ecological Complexity; accepted 2016.

A List of Papers Published in Refereed Journals (2016)

Nonlinear PDEs and Applications

1. N. VAN GOETHEM, *Dislocation-induced linear-elastic strain dynamics by a Cahn-Hilliard-type equation*, Mathematics and Mechanics of Complex Systems, 4, 2, 169–195, 2016. DOI:10.2140/memocs.2016.4.169
2. N. VAN GOETHEM, *The Frank tensor as a boundary condition in intrinsic linearized elasticity*, J. Geom. Mech., 8, 4, 391–411, 2016. DOI:10.3934/jgm.2016013
3. R. SCALA, N. VAN GOETHEM, *Constraint reaction and the Peach-Koehler force for dislocation networks*, Mathematics and Mechanics of Complex Systems 4, 2, 105–138, 2016. DOI:10.2140/memocs.2016.4.105
4. N. VAN GOETHEM, *Direct expression of Incompatibility in curvilinear systems*, The ANZIAM J., 58, 33–50, 2016. DOI:10.1017/S1446181116000158
5. R. SCALA, N. VAN GOETHEM, *Currents and dislocations and the continuum scale*, Meth. Appl. Analysis, 23, 1–34, 2016. DOI:10.4310/MAA.2016.v23.n1.a1
6. S. AMSTUTZ, N. VAN GOETHEM, *Analysis of the incompatibility operator and application in intrinsic elasticity with dislocations*, Siam J. Math. Analysis, 48, 320–348, 2016. DOI:10.1137/15M1020113
7. J.P. DIAS, M. FIGUEIRA, V.V. KONOTOP, *Coupled Nonlinear Schrödinger Equations with a Gauge Potential: Existence and Blowup*, Studies in Appl. Mathem., 136, 3, 241–262, 2016. DOI:10.1111/sapm.12102
8. J.P. DIAS, M. FIGUEIRA, F. OLIVEIRA, *Existence and linearized stability of solitary waves for a quasilinear Benney system*, Proc. Royal Soc. Edinburgh, Section A, 146, 547–564, 2016. DOI:10.1017/S0308210515000578
9. J.P. DIAS, M. FIGUEIRA, V.V. KONOTOP, *The Cauchy problem for coupled nonlinear Schrödinger equations with linear damping: Local and global existence and blowup of solutions*, Chin. Ann. Math. B, 37, 665–682, 2016. DOI:10.1007/s11401-016-1006-0
10. S. CORREIA, *Characterization of ground-states for a system of M coupled semilinear Schrödinger equations and applications*, Journal of Differential Equations, 260, 4, 3302–3326, 2016. DOI:10.1016/j.jde.2015.10.032
11. S. ANTONTSEV, J.I. DIAZ, *Finite speed of propagation and waiting time for local solutions of degenerate equations in viscoelastic media or heat flows with memory*, J. Elliptic and Parabolic Equations (JEPE), 2, 1 207–216, 2016. DOI:10.1007/BF03377402

12. S.N. ANTONTSEV, I.V. KUZNETSOV, *Singular Perturbations of forward-backward p -parabolic equations*, J. Elliptic and Parabolic Equations (JEPE), 2, 1, 357–370, 2016. DOI:10.1007/BF03377409
13. S. ANTONTSEV, S. SHMAREV, *On the localization of solutions of doubly nonlinear parabolic equations with nonstandard growth in filtration theory*, Applicable Analysis, 95, 10, 2162–2180, 2016. DOI:10.1080/00036811.2015.1043283
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Geometry

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2. T. FARIA, J.J. OLIVEIRA, *A Note on Stability of Impulsive Scalar Delay Differential Equations*, Electron. J. Qual. Theory Differ. Equ., Paper No. 69, 1–14, 2016. DOI:10.14232/ejqtde.2016.1.69
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Stochastic Analysis, Mathematical Physics And Applications

1. T. ARAÚJO, M.E. FERREIRA, *The topology of African exports: Emerging patterns on spanning trees*, Physica A, 462, 962–976, 2016. DOI:10.1016/j.physa.2016.06.044
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5. R. VILELA MENDES, *An extended Dirac equation in non-commutative space-time*, Mod. Phys. Lett. A, 31, 15, 1650089, 2016. DOI:10.1142/S0217732316500899

Mathematical Logic

1. B. DINIS, G. FERREIRA, *Instantiation overflow*, Reports on Mathematical Logic, 51, 15–33, 2016. DOI:10.4467/20842589RM.16.002.5279 (Available at <http://rml.tcs.uj.edu.pl/rml-51/02-ferreira.pdf>)
2. M. EDMUNDO, L. PRELLI, *Sheaves on T-topologies*, Journal of the Mathematical Society of Japan, 68, 1, 347–381, 2016. <http://mathsoc.jp/publication/JMSJ/onlineindex/68-1.htm>
3. M. EDMUNDO, M. MAMINO, L. PRELLI, *On definably proper maps*, Fundamenta Mathematicae, 233, 1, 1–36, 2016. <http://doi.org/10.4064/fm96-12-2015>
4. F. FERREIRA, G. FERREIRA, *An elementary proof of strong normalization for atomic F* , Bulletin of the Section of Logic, 45, 1, 1–15, 2016. <http://www.filozof.uni.lodz.pl/bulletin/bazalissue.php?g=45&d=%271%27&long=true%E2%80%8B>
5. J. RASGA, C. SERNADAS, A. SERNADAS, *Preservation of admissible rules when combining logics*, Review of Symbolic Logic, 9, 4, 641–663, 2016. DOI:10.1017/S1755020316000241

Biomathematics and Statistics

1. ANOTIDA MADZVAMUSE, H.S. NDAKWO, RAQUEL BARREIRA, *Stability analysis of reaction-diffusion models on evolving domains: the effects of cross-diffusion*, Discrete and Continuous Dynamical Systems (A), 36, 4, 2133–2170. DOI:10.3934/dcds.2016.36.2133
2. MAÍRA AGUIAR, NICO STOLLENWERK, SCOTT B. HALSTEAD, *The risks behind DengVaxia recommendation*, The Lancet Infectious Diseases, 16, 8, 882–883, 2016. DOI:10.1016/S1473-3099(16)30168-2
3. SCOTT B. HALSTEAD, MAÍRA AGUIAR, *Caveat Emptor: Dengue vaccine and the 2016 Olympics*, The Lancet, 388, No. 10041, 237–238, 2016. DOI:10.1016/S0140-6736(16)31048-0

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5. LUÍS MATEUS, PEYMAN GHAFARI, URSZULA SKWARA, FILIPE ROCHA, MAÍRA AGUIAR, DAVIDE MASOERO, NICO STOLLENWERK, *Semiclassical approximations of stochastic epidemiological processes towards parameter estimation using as prime example the SIS system with import*, Ecological Complexity, 27, 63–73, 2016. DOI:10.1016/j.ecocom.2015.09.001
6. MAÍRA AGUIAR, SCOTT B. HALSTEAD, NICO STOLLENWERK, *Consider stopping dengvaxia administration without immunological screening*, Expert Review of Vaccines, 16, 4, 301–302, 2016. DOI:10.1080/14760584.2017.1276831
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8. S.B. HALSTEAD, M. AGUIAR, *Is discussion of dengue vaccination for the 2016 Olympics necessary?*, The Lancet, 388, No. 10054, 1881–1882, 2016. DOI:10.1016/S0140-6736(16)31718-4
9. L. MATEUS, D. MASOERO, F. ROCHA, M. AGUIAR, U. SKWARA, P. GHAFARI, JEAN-CLAUDE ZAMBRINI, N. STOLLENWERK, *Epidemiological models in semiclassical approximation: an analytically solvable model as a test case*, Mathematical Methods in Applied Sciences, 39, 16, 4914–4922. DOI:10.1002/mma.4108
10. F. ROCHA, L. MATEUS, U. SKWARA, M. AGUIAR, N. STOLLENWERK, *Understanding dengue fever dynamics: a study of seasonality in vector borne disease models*, International Journal of Computer Mathematics, 9, 8, 1405–1422, 2016. DOI:10.1080/00207160.2015.1050961
11. S. CORDEIRO, J.J. GOMES, I. MENDES, D. MARTINS, A. SOUSA, R. ANJOS, *Doppler Flow Pattern and Arterial Stiffness in Patients with Aortic Coarctation*, Pediatric Cardiology, 37, 8, 1465–1468, 2016. DOI:10.1007/s00246-016-1458-8
12. P. HELIODORO, M. MOUTA LOPES, C.S. PINHO, M. ROSÁRIO RAMOS, *The Impact of Audit Reports on Auditor Change – Verification of the Determining Factors for Auditor Change in the Portuguese Context*, International Journal of Business and Social Science, 7, 10, 1–14, 2016. <http://www.ijbssnet.com/journal/index/3607>
13. T. MAGALHÃES, S. LOPES, J.J. GOMES, F. SEIXO, *The Predictive Factors on Extended Hospital Length of Stay in Patients with AMI: Laboratory and Administrative Data*, Journal of Medical Systems, 40, 1, 1–7, 2016. DOI:10.1007/s10916-015-0363-7

Appendix: Complementary Information

Nonlinear PDEs and Applications

Research projects

“Mathematical theory of dislocations: geometry, analysis, and modelling”, FCT Starting Grant (IF/00734/2013), PI: Nicolas Van Goethem, Funding: 50 k€

Communications in seminars or conferences

International

H. B. DE OLIVEIRA, *Analysis of a turbulence k -epsilon model with applications in porous media*, The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications; Orlando, Florida, U.S.A., 1–5 July 2016. (Invited)

H. B. DE OLIVEIRA, *Evolution problems of Navier-Stokes type with anisotropic diffusion*, Seminário de Equações Diferenciais do Departamento de Matemática - Universidade Federal de Santa Catarina, Brasil, 5 October 2016. (Invited)

H. B. DE OLIVEIRA, *Existence results for a one-equation turbulent model with feedback forces field*, Colóquio de Matemática da Universidade Federal de Santa Catarina, Brasil, 7 October 2016. (Invited)

H. B. DE OLIVEIRA, *On a turbulent k -epsilon model with applications in porous media*, 2nd IMPA - InterPore Conference on Porous Media: Conservation Laws, Numerics and Applications IMPA; Rio de Janeiro, Brazil, 16–19 October 2016.

J. P. DIAS, *On a quasilinear non-local Benney system*, 6th IST-IME Meeting, IST, Lisboa, 5–9 September 2016. (Invited)

A. C. BARROSO, *Second-order structured deformations: relaxation, integral representation and applications*, 6th Iberian Mathematical Meeting, Santiago de Compostela, Spain, October 2016. (Invited)

L. SARAIVA, *As primeiras publicações de periódicos no Brasil, 1808–1820*, 2^o Encontro Ibérico de História da Matemática, Coimbra, 14–16 July 2016.

M. MANUEL MARQUES, *On the “non-convex” mathematical work of Jean Jacques Moreau*, Colloquium Lagrangianum 2016, Montpellier, 18–20 May 2016. (Invited)

M. MANUEL MARQUES, *BV evolution problems with time dependent domains*, Recent trends in differential equations 2016 (in celebration of A. Cellina and A. Bressan), Aveiro, 27–29 June 2016. (Invited)

J.F. Rodrigues, “Two Phases Heterogeneous Problems of Obstacle-Type for the p -Laplacian” (two lectures), Otto-von-Guericke-School in Partial Differential equations, at the University of Magdeburg, March 14–18, 2016.

J.F. Rodrigues, “On a Variational Inequality for Incompressible Non-Newtonian Thick Flows”, Oberseminar Analysis, Fakultät für Mathematik, Universität Regensburg, July 20, 2016. www.uni-regensburg.de/Fakultaeten/nat_Fak_I/aktuelles/mathwoch.html?StartDatum=2016-07-19

J.F. Rodrigues, “On a Class of Variational Inequalities with Derivative Constraints arising in type-II superconductors and in Incompressible Non-Newtonian Thick Flows”, Workshop on Free boundary, partial differential equations and related topics; Weierstrass Institute (WIAS), Berlin, December 19–20, 2016. www.wias-berlin.de/workshops/index.jsp?lang=1

National

H. B. DE OLIVEIRA, *Anisotropic perturbations of the generalized Navier-Stokes equations*, Seminários do CIDMA, Universidade de Aveiro, 17 November 2016. (Invited)

Theses supervised (PhD, MSc)

MARAT NURTAS, Dissertation topic “Straight and inverse problems for acoustics equation for the poroelastic medium”, PhD in 6D070500 - “Mathematical and computer modeling”, Kazakh-British Technical University, Tole bi 59, Almaty, 050000, Kazakhstan, co-supervisors Prof. S. Antontsev and Prof. A. Meirmanov, (Defence 29-12-2016, Almaty).

1 ongoing PhD thesis.

Conferences and courses organized

2º Encontro Ibérico de História da Matemática, Coimbra, 14–16 July 2016. (L. SARAIVA, coordinator of the scientific comitee for Portugal)

29º Encontro do Seminário Nacional de História da Matemática, Faculdade de Ciência e Tecnologia da Universidade Nova de Lisboa. 18–19 November 2016 (L. SARAIVA, president of the scientific comitee)

Editorial activity

J.F. Rodrigues, coordinator-editor of Interfaces and Free Boundaries, and executive-editor of Portugaliae Mathematica.

J.P. Dias, associate editor of Portugaliae Mathematica.

Book chapters

ANCA-MARIA TOADER, CRISTIAN BARBAROSIE, *Optimization of Eigenvalues and Eigenmodes by using the Adjoint Method*, in *Topological Optimization and Optimal Transport In the Applied Sciences*; Radon Series on Computational and Applied Mathematics, Vol. 17; by Maitine Bergounioux (Editor), Édouard Oudet (Editor), Martin Rumpf (Editor), Guillaume Carlier (Editor), Thierry Champion (Editor); Walter de Gruyter, 10 October 2016. (ISBN-13: 978-3110439267)

FERNANDO MIRANDA, JOSÉ FRANCISCO RODRIGUES, *On a variational inequality for incompressible non-Newtonian thick flows*, Recent advances in partial differential equations and applications, 305–316, Contemp. Math., 666, Amer. Math. Soc., Providence, RI, 2016.

Articles in proceedings

H. B. DE OLIVEIRA and A. PAIVA, *On a One-Equation Turbulent Model with Feedbacks*, Differential and Difference Equations with Applications, Volume 164 of the series Springer Proceedings in Mathematics & Statistics, 51–61, 2016.

Other

J.F. Rodrigues is director of Centro Internacional de Matemática since February 2016.

Operations Research

Research Projects

“RORNET - Modelação de Problemas de Roteamento e Escalonamento (Modeling Routing and Rostering with Network Flows)” FCT: PTDC/MAT-NAN/2196/2014. Funding: 199.598,00€. Dates 01-01-2016 to 31-12-2018. PI: Luís Gouveia.

“DO-ILT: Optimización discreta para problemas integrados en logística y transporte.” (MTM2015-63779-R), projeto de grupo financiado pelo Ministerio de Economía y Competitividad, Espanha. Francisco Saldanha da Gama, investigador internacional do projecto. Investigador principal: Elena Fernández. (2016–2019)

“Embedding Risk in Supply Chain Network Design Problems”, Main researcher: Francisco Saldanha da Gama. Cooperação transnacional Portugal-Alemanha financiado pela FCT: Dates: 2015 e 2016 - Funding: 4000 Euros.

Projecto A5USER em parceria com a Brisa Inovação. Terminado em 2016. J.M. Paixão, responsável.

“Dimensionamento de Pessoal de Enfermagem em Unidades Hospitalares - *Nursing staff dimensioning in hospital units*”, CHAMADA UNIVERSAL – MCTI/CNPq Nº 14/2014 – Faixa B, financiado por Ministério da Ciência, Tecnologia e Inovação e Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brasil. Margarida Vaz Pato, colaboradora do grupo de investigação Educação a Distância no Ensino das Áreas da Saúde, Fundação da Universidade Federal de Ciências da Saúde de Porto Alegre, coordenado por Cecília Dias Flores, com a participação de uma equipa do Brasil (Rute Merlo Somensi, Rita Catalina Aquino Caregnato, Roberta de Almeida da Silva, Gustavo Cervi) e de Portugal (Ana Respício, Margarida Moz, Margarida Vaz Pato), a partir de novembro de 2014.

“ALTERFOR - Alternative models for future forest management” (<https://www.alterfor-project.eu/>). Remark: ALTERFOR is a large-scale, collaborative research project funded under the EU’s Horizon 2020 research programme, coordinated by the Swedish University of Agricultural Sciences (SLU). In Portugal, the project is coordinated by José G. Borges from Forest Research Centre/School of Agriculture/University of Lisbon (CEF/ISA/ULisboa). Isabel Martins, member.

“Red Iberoamericana de Logística Inteligente en la Gestión Sostenible del Transporte en Núcleos Urbanos”, 2015-2018, Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo (CYTED), Spain, Red 515RT0489 (PI: Francisco Javier Faulin Fajardo). Pedro Martins, member.

“mKEP - Modelos e Algoritmos de optimização em programas de doação renal cruzada”. Participant researcher: Miguel Constantino. PTDC/IIM-GES/2830/2014 - Funding 24.807,00€. Dates 01-04-2016 to 31-03-2019

“Estruturação de Ferramentas de Gestão - A5/BD&BA”. PI: José Pinto Paixão. Funding: 20.500€. Dates 01-12-2015 to 30-11-2016

NATO DAT-PoW “**Safeport - Protection of Harbours and Ports**”. PI: António Rodrigues. Dates: 11-04-2012 to 30-04-2015. Funding: 295,021.80€

Colaboração no Programa de Investigação “**Análise de Tráfego e Big Data**”, da Fundação da FCUL para a Brisa Inovação e Tecnologia, S.A. — Subprojecto “PREV1 - Preditor de volumes horários de tráfego em pontos da rede”

“Dimensionamento de Pessoal de Enfermagem em Unidades Hospitalares - Nursing staff dimensioning in hospital units”, CHAMADA UNIVERSAL – MCTI/CNPq Nº 14/2014 – Faixa B, financiado por Ministério da Ciência, Tecnologia e Inovação e Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Brasil, colaboradora do grupo de investigação Educação a Distância no Ensino das Áreas da Saúde, Fundação da Universidade Federal de Ciências da Saúde de Porto Alegre, coordenado por Cecília Dias Flores, com a participação de uma equipa do Brasil (Rute Merlo Somensi, Rita Catalina Aquino Caregnato, Roberta de Almeida da Silva, Gustavo Cervi) e de Portugal (Ana Respício, Margarida Moz, Margarida Vaz Pato), a partir de novembro de 2014.

Communications in seminars or conferences

International

L. GOUVEIA, “Network flow precedence based formulations for the asymmetric traveling salesman problem (with precedence constraints)”, Optimization Days 2016, Canada - Montreal, 2–4 May 2016.

L. GOUVEIA, “Spanning Trees with a constraint on the number of leaves. A new formulation”, 13th Informatics Telecommunications Conference, Boca Raton, 20–22 March 2016.

L. GOUVEIA, M. RUTHMAIR, D. SANTOS, “Routing Problems for Electric Vehicles with Load-Dependent Energy Consumption”, ICCL 2016 - 7th International Conference on Computational Logistics, Lisbon, 7–9 September 2016.

L. FERREIRA, Participação no seminário SUFORUN: Forest Planning Under Uncertainty e apresentação de comunicação intitulada “A climate change adaptive dynamic programming approach to optimize eucalypt stand management scheduling: A Portuguese application.”, em Madrid, 26 e 27 de setembro de 2016. (Invited)

T. VICENTE, V. MÓRA, M. C. MOURÃO, J. RIBEIRO; “Routes for money collection operators”. ICCL’16 – 7th International Conference on Computational Logistics. Faculdade de Ciências, Universidade de Lisboa, Portugal; setembro 2016.

M. C. MOURÃO, M. CONSTANTINO; L.S. Pinto; “Dissimilar routine routing problems”. WARP2 – 2nd Workshop on Arc Routing Problems. ISEG, Universidade de Lisboa, Portugal; maio 2016.

M. J. CORTINHAL, M.C. MOURÃO, A.C. NUNES, “A sectoring-routing algorithm for the mixed capacitated arc routing problem with attractive service areas”. WARP2 – 2nd Workshop on Arc Routing Problems. ISEG, Universidade de Lisboa, Portugal; maio 2016.

L. S. PINTO, J. JANELA, M. C. MOURÃO, “Mixed arc routing and waste collection – a case study”. WARP2– 2nd Workshop on Arc Routing Problems. ISEG, Universidade de Lisboa, Portugal; maio 2016.

M. EUGÉNIA CAPTIVO, CATARINA MATEUS, INÊS MARQUES, “Heuristics for Different Perspectives of a Surgical Case Assignment Problem”, EURO XXVIII – 28th European Conference on Operational Research, Poznan, Polónia, July, 2016 (Convidadas)

INÊS MARQUES, M. EUGÉNIA CAPTIVO, “A robust approach for a surgical case assignment problema”, EURO XXVIII - 28th European Conference on Operational Research, Poznan, Polónia, July, 2016 (Convidadas)

M. EUGÉNIA CAPTIVO, CATARINA MATEUS, INÊS MARQUES, “Heuristics for a Surgical Case Assignment Problem”, CLAIO - XVIII Congreso Latino-Iberoamericano de Investigación Operativa, Santiago, Chile, October, 2016.

CATARINA MATEUS, INÊS MARQUES, M. EUGÉNIA CAPTIVO, “Different Perspectives for a Surgical Case Assignment Problem: Heuristic Approaches”, ORAHS 2016 – 42nd Annual Conference on Operational Research Applied to Health Services, Pamplona, Espanha, July, 2016.

INÊS MARQUES, M. EUGÉNIA CAPTIVO, “A robust optimization approach for a surgical case assignment problem: the case of a portuguese hospital”, ORAHS 2016 - 42nd Annual Conference on Operational Research Applied to Health Services, Pamplona, Espanha, July, 2016.

P. CASTILLO-CASTILLO, P. CASTRO, V. MAHALEC. *A Novel Deterministic Global Optimization Algorithm and its Application to Oil Refinery Planning*. AIChE 2016 Annual Meeting, San Francisco, CA, USA.

P. CASTILLO-CASTILLO, P. CASTRO, V. MAHALEC. *Multiperiod Inventory Pinch Algorithm for Integrated Planning and Scheduling of Oil Refineries*. AIChE 2016 Annual Meeting, San Francisco, CA, USA.

P. CASTRO. *Global Optimization of Crude Oil Scheduling with Discrete and Continuous-Time Formulations*. AIChE 2016 Annual Meeting, San Francisco, CA, USA.

P. CASTRO. *Global Optimization Algorithm for MIQCPs Featuring Spatial Branch-and-Bound and Multiparametric Disaggregation*. AIChE 2016 Annual Meeting, San Francisco, CA, USA.

H. MOSTAFAEI, P. CASTRO. *Scheduling Straight Multiproduct Pipelines with Generalized Disjunctive Programming*. AIChE 2016 Annual Meeting, San Francisco, CA, USA.

P. CASTILLO CASTILLO, V. MAHALEC, P. CASTRO. *Global Optimization of Nonlinear Gasoline Blend Planning and Scheduling Problems*. 66th Canadian Chemical Engineering Conference, Québec City, QC, Canada.

HOSSEIN MOSTAFAEI, PEDRO M. CASTRO. *Continuous-Time Formulation for Oil Products Transportation Scheduling*. ICCL 2016, Lisbon, Portugal

PEDRO M. CASTRO. *Spatial branch and bound algorithm for the global optimization of MIQCPs*. ESCAPE-26, Portoroz, Slovenia.

PEDRO CASTILLO-CASTILLO, PEDRO M. CASTRO, GANG FU, VLADIMIR MAHALEC. *Short-term crude mix and operating conditions optimization for oil refinery operations*. ESCAPE-26, Portoroz, Slovenia.

A. COSTA, J. P. PAIXÃO, “Surrogate Constraint Relaxations for a Capital Budgeting Model with the Option to Defer”. CO 2016 - International Symposium on Combinatorial Optimisation 2016, University of Kent Canterbury Campus, England, September 2016

MARGARIDA MOZ, REINALDO DA SILVA FERREIRA, VASCO MÓRA, JOÃO RIBEIRO, “Routes for parking enforcement officers”, ICCL 2016 - 7th Conference on Computational Logistics, Lisboa, Portugal, Setembro de 2016.

CARLOS LÚCIO MARTINS, TERESA MELO, MARGARIDA VAZ PATO, “A tri-objective strategic model for a food bank supply chain”, *ICCL’16 – 7th International Conference on Computational Logistics “Road to logistics excellence”*, organizada por CMAFCIO, Faculdade de Ciências, Universidade de Lisboa, em Lisboa, setembro de 2016.

JERÖEN BELIEN, HANS W. HITTMANN, MARCO LAUMANN, JOÃO MIRANDA, ANA PAULA TEIXEIRA, MARGARIDA VAZ PATO, “European Study on OR/MS Education: Brief Results and Preliminary Trends”, *EURO XXVIII – European Congress on Operational Research*, comunicação convidada apresentada na sessão Panel: European Study on OR/MS Education e no tema *Initiatives for OR Education*, em Poznań, Polónia, julho de 2016.

MARIA DA CONCEIÇÃO FONSECA, CARLOS LÚCIO MARTINS E MARGARIDA VAZ PATO, “Modeling the Steering of International Roaming Traffic”, *EURO XXVIII – European Congress on Operational Research*, comunicação convidada apresentada na sessão *Flows and Routing Problems* e no tema *Telecommunications and Network Optimization*, em Poznań, Polónia, julho de 2016.

ISABEL MARTINS, “Branch-and-cut for forest harvest scheduling problems subject to clearcut and core area constraints”, OR2016, International Conference on Operations Research - Annual Conference of the German Operations Research Society, Hamburg, Aug 30 - Sept 2, 2016.

M. J. CORTINHAL, M. C. MOURÃO, A. C. NUNES, “A sectoring-routing algorithm for the mixed capacitated arc routing problem with attractive service areas”, *WARP2 – 2nd Workshop on Arc Routing Problems*, 22 a 25 de maio de 2016, ISEG.

ISABEL MARTINS, “Ecological concerns in forest management - an integer programming approach”, Seminário IO – Gestão Florestal e Proteção da Biodiversidade, Departamento de Matemática, FCT-UNL, Nov 16, 2016 (Invited)

L. E. GOUVEIA, P. F. PATRÍCIO, A. F. DE SOUSA, *Maximization of protected demand in telecommunication networks using partial disjoint paths*, 8th International Workshop on Resilient Networks Design and Modeling, RNDM 2016, Halmstad, Sweden, 13th-15th September 2016.

M. JOÃO LOPES, M. JOÃO CORTINHAL e M. TERESA MELO, “Design of Multi-Echelon Supply Chain Network under Outsourcing Opportunities”, apresentada na Conferência ICCL’16 (7th International conference on Computational Logistics), realizada em Lisboa, Portugal, de 7 a 9 de Setembro de 2016.

R. BERNARDINO, A. PAIAS, “Metaheuristics Based on Decision Hierarchies for the Traveling Purchaser Problem”, ICCL2016, 7th International Conference on Computational Logistics, Lisbon, September 2016.

M. MESQUITA, A. PAIAS, “A Hybrid Metaheuristic for Planning Vessel Routes in Fishery Surveys”, ICCL2016, 7th International Conference on Computational Logistics, Lisbon, September 2016.

A. PAIAS, M. MESQUITA, L. WISE, “A Metaheuristic Approach to Fisheries Survey Route Planning”, *VeRoLog 2016: annual workshop of the EURO working group on Vehicle Routing and Logistics optimization*, Nantes, June 2016.

M. MESQUITA, A. PAIAS, “A Benders based heuristic for a m-TSP with multiple time windows and selective cities”, *VeRoLog 2016: annual workshop of the EURO working group on Vehicle Routing and Logistics optimization*, Nantes, June 2016.

M. C. FONSECA, “Modeling the Steering of International Roaming Traffic”, 28th European Conference on Operational Research, Póznán, Poland, 3–6 July 2016

M. C. FONSECA, “Distribution of Agricultural Products in a Short Distribution Channel. A Case Study in the Peninsula of Setubal”. ICCL, 2016, Lisbon, Portugal, 7–9 September 2016

F. SALDANHA DA GAMA, “The stochastic uncapacitated r-allocation p-hub median problem: modeling framework and heuristic solutions”, Workshop on Urban Operations Research 2016, Nanzan University, Nagoya, Japan, December 10–11, 2016. (Invited)

I. CORREIA, S. NICKEL, F. SALDANHA DA GAMA, "An enhanced MILP model for stochastic multiperiod multiple allocation hub location", INFORMS 2016, Conferência annual do Institute for the Operations Research and Management Science, Nashville, Tennessee, EUA, 13–16 Novembro, 2016.

I. CORREIA, S. NICKEL, F. SALDANHA DA GAMA, “A Modeling Framework for Stochastic Multi-Period Capacitated Multiple Allocation Hub Location”, ILS 2016–Information Systems Logistics and Supply Chain, 6th International Conference, Talence, Bordéus, França, 1–4 Junho, 2016.

National

L. FERREIRA, Apresentação do seminário intitulado “A climate change adaptive dynamic programming approach to optimize eucalypt stand management scheduling: A Portuguese application.”, na Faculdade de Ciências e Tecnologia, da Universidade Nova de Lisboa, no dia 16 de novembro de 2016. (Invited)

L. FERREIRA, Apresentação de palestra intitulada “Matemática na Gestão Florestal.”, na Escola Básica Integrada de Colmeias, que decorreu no dia 19 de fevereiro de 2016. (Invited)

PEDRO MARTINS, “Cliques em grafos: aplicações a redes biológicas”. Seminário apresentado no Laboratório de Bioestatística e Informática Médica da Faculdade de Medicina da Universidade Coimbra, no dia 3 de Novembro de 2016. (Convite do Professor Doutor Miguel Patrício.)

A. PAIAS, M. MESQUITA, A. MURTA, L. WISE, “Tutorial: Planeamento de Rotas na Amostragem de Espécies Marinhas”, Jornadas De Primavera de MAEG, Instituto Superior de economia e Gestão, Universidade de Lisboa, Abril de 2016 (Invited)

Theses supervised (PhD, MSc)

ANGELO ALIANO FILHO, “Problemas do Corte Multiobjetivo Inteiro”. Margarida Vaz Pato, coorientadora, sendo orientador Antônio Carlos Moretti. Doutorado em Matemática Aplicada (código 79) pelo Instituto de Matemática Estatística e Computação Científica, Universidade Estadual de Campinas (UNICAMP), Brasil, concluída em março de 2016.

23 completed MSc thesis.

3 ongoing PhD thesis.

30 ongoing MSc thesis.

Conferences and courses organized

ORAHS 2016 - 42th annual meeting of the EURO working group on OR Applied to Health Services, organizado pela Public University of Navarre, Pamplona, Espanha, 24 a 29 de Julho de 2016.

Portuguese Meeting in Biomathematics 2016, Universidade da Beira Interior, October 13-14, 2016. (Pedro Ferrão Patrício, membro da Comissão Organizadora.)

Inês Marques, membro da Comissão de Programa do HA 2016, Special Session on Health Applications, enquadrado no SIMULTECH 2016, 6th International Conference on Simulation and Modeling Methodologies, Technologies and Applications, Lisboa, Portugal, 29 a 31 de Julho.

Inês Marques, membro da Comissão de Programa do EURO XXVIII 2016, 28th European Conference on Operational Research, Poznan, Polónia, 3 a 6 de Julho.

ICCL2016, International conference in Computational Logistics, Faculdade de Ciências, Universidade de Lisboa, September, 2016. (Chairs: Ana Paias, Universidade de Lisboa; Ana Pereira, Wide Scope; Mario Ruthmair, University of Vienna and Stefan Voss, University of Hamburg).

5th Winter School on Network Optimization, Estoril, January 2016. (Chair: Luis Gouveia)

ISCMi 2016 - 3rd International Conference on Soft Computing & Machine Intelligence, Dubai, United Arab Emirates, 23–25 de Novembro de 2016. (F. Saldanha da Gama, membro da comissão científica.)

ISCBi 2016 - 4th International Symposium on Computational and Business Intelligence, Olten, Suíça, 5–7 de Setembro de 2016. (F. Saldanha da Gama, membro da comissão científica.)

WARP2 - 2nd Workshop on Arc Routing Problems. ISEG, Universidade de Lisboa, Portugal; maio de 2016.

Editorial activity

Luís Gouveia, associate editor of Computers and O.R., Networks, and RAIRO.

F. Saldanha da Gama, editor-chefe da revista científica Computers & Operations Research, <https://www.journals.elsevier.com/computers-and-operations-research/>

Inês Marques, editora convidada na edição especial da revista Journal of Industrial and Management Optimization (JIMO), no âmbito da EURO 2016, 28th European Conference on Operational Research, com o tema Optimization in Logistics and Scheduling Applications. 2016.

Inês Marques, editora convidada na edição especial da revista Operations Research for Health Care (ORHC), no âmbito da EURO 2016, 28th European Conference on Operational Research, com o tema New Advances in Health Care Applications. 2016.

Computational Logistics, 7th International Conference, ICCL 2016, Lisbon, Portugal, September 7-9, 2016, Proceedings. A. Paias, M. Ruthmair, S. Voß, S. (Eds.). Springer International Publishing Switzerland. Doi: 10.1007/978-3-319-44896-1.

Book chapters

PEDRO M. CASTRO. *Improving Energy Efficiency in Batch Plants through Direct Heat Integration*. In *Alternative Energy Sources and Technologies: Process Design and Operation*, Mariano Martin (ed.), 341–362, Springer, 2016.

P. MARTINS, *Planning production and workforce in a discrete-time financial model: optimizing cash-flows released*, in *Computational Management Science*, Lecture Notes in Economics and Mathematical Systems, 682, 115–121, Springer, 2016. www.springer.com/gp/book/9783319204291

D. DOMINGOS, A. RESPÍCIO, R. MARTINHO, *Reliability of IoT-Aware BPMN Healthcare Processes*, in “Internet of Things and Advanced Application in Healthcare”, IGI Global, 214–248, 2016.

C.D. FLORES, A. RESPÍCIO, H. COELHO, M.R. BEZ, J.M. FONSECA, *Simulation for Medical Training*, in “Encyclopedia of E-Health and Telemedicine”, 827–842, IGI Global, 2016.

L. GOUVEIA, M. RUTHMAIR, D. SANTOS, *Um modelo de fluxo para o electric traveling salesman problem*, in “A Investigação Operacional em Portugal - Novos Desafios, Novas Ideias”, 133–143, IST Press (C.H. Antunes, D.M. Cardoso, F.N. da Silva, Eds.), Lisboa, 2016

JOSÉ L. N. CARMO, ANTÓNIO J. L. RODRIGUES, *Previsão de densidades e decisão óptima*, in “A Investigação Operacional em Portugal — Novos Desafios, Novas Ideias”, 235–247, IST Press (C.H. Antunes, D.M. Cardoso, F.N. da Silva, Eds.), 2016

Articles in proceedings

J. CARDOSO, M.C. MOURÃO, “Escalonamento de pessoal em voluntariado – uma aplicação a um corpo de bombeiros”, *Boletim APDIO*, 54, (ed.) A. Carvalho, T. Ramos, Edição da Associação Portuguesa de Investigação Operacional, CESUR – IST, Lisboa.

HOSSEIN MOSTAFAEI, PEDRO M. CASTRO. *Continuous-Time Formulation for Oil Products Transportation Scheduling*. In *Lecture Notes in Computer Science*, Vol 9855. Editors: Ana Paias, Mario Ruthmair, Stefan Voß, Springer, 384-396. 2016

PEDRO M. CASTRO. *Spatial branch and bound algorithm for the global optimization of MIQCPs*. In *Computer Aided Chemical Engineering*, Vol 38. Editors: Zdravko Kravanja, and Milos Bogataj, Elsevier, 523-528. 2016.

PEDRO CASTILLO CASTILLO, PEDRO M. CASTRO, GANG FU, VLADIMIR MAHALEC. *Short-term crude mix and operating conditions optimization for oil refinery operations*. In *Computer Aided Chemical Engineering*, Vol 38. Editors: Zdravko Kravanja, and Milos Bogataj, Elsevier, 763-768. 2016.

L. E. GOUVEIA, P. F. PATRÍCIO, A. F. DE SOUSA, *Maximization of protected demand in telecommunication networks using partial disjoint paths*, *Proceedings of 2016 8th International Workshop on Resilient Networks Design and Modeling, RNDM 2016*, pp 72-78.

Posters

L. FERREIRA, Participação como coautora no trabalho intitulado “Percorrendo a fila: uma abordagem descritiva para o ensino secundário” (poster), apresentado por Helena Ribeiro, na Conferência Internacional – Investigação, Práticas e Contextos em Educação, que decorreu na Escola Superior de Educação e Ciências do Instituto Politécnico de Leiria, nos dias 8 e 9 de maio de 2016.

L. FERREIRA, Participação como coautora no trabalho intitulado “A luz e suas propriedades vão a escolas básicas” (poster), apresentado por Conceição Nogueira, na Conferência Internacional – Investigação, Práticas e Contextos em Educação, que decorreu na Escola Superior de Educação e Ciências do Instituto Politécnico de Leiria, nos dias 8 e 9 de maio de 2016.

L. FERREIRA, Participação como coautora no trabalho intitulado “CiênciaLIZar – Centro de Recursos para o Ensino das Ciências” (poster), apresentado por Alexandra Baptista, na Conferência Internacional – Investigação, Práticas e Contextos em Educação, que decorreu na Escola Superior de Educação e Ciências do Instituto Politécnico de Leiria, nos dias 8 e 9 de maio de 2016.

Geometry

Communications in seminars or conferences

International

T. MONTEIRO FERNANDES, *Relative Riemann-Hilbert correspondence*, Congresso Lisboa “Iberian meeting in algebraic analysis” 8–10 Junho 2016 (Invited)

T. MONTEIRO FERNANDES, *A result on holomorphic functions relatively tempered with respect to a projection*, Congresso Lisboa CMAFCIO, organizado por Luca Prelli, 2 Setembro 2016 (Invited)

T. MONTEIRO FERNANDES, Seminário *Riemann-Hilbert correspondence for mixed twistor D-Modules*, Pádua, 8 Novembro 2016 (Invited)

ANTÓNIO ARAÚJO, “Ruler, Compass and Nail: 360 degree Spherical Perspective made simple”, X Workshop on Statistics, Mathematics and Computation (WSMC10), V Portuguese-Polish Workshop on Biometry (Invited)

National

Á. QUINTINO, *Polynomial conserved quantities for constrained Willmore surfaces*, Encontro Nacional da Sociedade Portuguesa de Matemática 2016, Escola Superior de Tecnologia do Barreiro, Instituto Politécnico de Setúbal (Invited)

T. MONTEIRO FERNANDES, *Correspondência de Riemann Hilbert relativa*, Universidade do Porto, 18 Novembro 2016 (Invited)

ANTÓNIO ARAÚJO, “Matemática e Arte: as anamorfoses e as infinitas perspetivas”. X jornadas do CIAC, Faro, 4 e 5 fevereiro 2016

ANTÓNIO ARAÚJO, “Uma perspectiva esférica a 360 graus, de construção elementar por régua, compasso, e prego”, Encontro Nacional da Sociedade Portuguesa de Matemática, Escola Superior de Tecnologia do Barreiro do Instituto Politécnico de Setúbal, 11–13 Julho, 2016

ANTÓNIO ARAÚJO, “Matemática e Arte: Anamorfose e o bestiário das perspectivas exóticas”, *Tarde de Matemática*, Sociedade Portuguesa de Matemática, 27 janeiro 2016

Book chapters

A. FERNANDES-MARCOS, A. MARTINS, A. SALDANHA, A. ARAÚJO, E. CARVALHO, J. BIDARRA, J. COELHO, P. SHIRLEY, P. VEIGA, chapter *Enhancement of Russian Creative Education: new post-graduation programme in digital art practice in Russian Creative Education in Digital Arts in Line with EU Standards*, Sergei Kurasov (editor), Universidade Aberta, Portugal, 2016.

A. C. Quintino, *Transformations of Generalized Harmonic Bundles and Constrained Willmore Surfaces* (invited contribution), *Willmore Energy and the Willmore Conjecture*, CRC Press, Taylor and Francis Ltd. (to appear); accepted 2016.

Articles in proceedings

Á. QUINTINO, *The Willmore Conjecture: a celebration of Mathematics*, CIM Bulletin, 37, 33–40, 2016.

Ordinary Differential Equations and Dynamical Systems

Books

PEDRO DUARTE, SILVIUS KLEIN, *Lyapunov Exponents of Linear Cocycles: Continuity via Large Deviations*, Atlantis Series in Dynamical Systems, Springer, 2016. ISBN:978-94-6239-124-6 www.springer.com/gp/book/9789462391239

Research projects

Alexandre Simões, Prémio Gulbenkian de Estímulo à Investigação, supervision by Carlota Rebelo, completed December 2016. Funding: 10 k€

Diogo Caetano, Prémio Gulbenkian de Estímulo à Investigação, supervision by Teresa Faria, starting December 2016. Funding: 10 k€

Communications in seminars or conferences

International

C. SERPA, On systems of iterative functional equations, ECIT 2016 - European Conference on Iteration Theory - Bildungshaus Grillhof - Innsbruck, Áustria, 8 de Setembro de 2016

C. REBELO, *Persistence in seasonally varying predator-prey systems*, The first Joint Meeting Brazil – Italy in Mathematics (IMPA, Rio de Janeiro, Agosto-Setembro 2016) (Invited)

A. MARGHERI, *Dynamics of a Kepler problem with linear drag*, The first Joint Meeting Brazil – Italy in Mathematics (IMPA, Rio de Janeiro, Agosto-Setembro 2016) (Invited)

C. REBELO, *Multiplicity of solutions of BVPs associated to asymptotically linear equations*, An Afternoon of Nonlinear Problems (Milão, 27 Janeiro 2016) (Invited)

T. FARIA, *Asymptotic behaviour for some classes of non-autonomous delay differential equations*, 6th IST-IME Meeting, IST-Universidade de Lisboa, September 5-9, 2016 (Invited)

T. FARIA, *Persistence and stability for some cooperative population models with delays*, 7th Workshop Dynamical Systems Applied to Biology and Natural Sciences DSABNS 2016, Universidade de Évora, February 02-05, 2016 (Invited)

T. FARIA, *Delay Differential Equations in Population Dynamics* (six lectures), in “Workshop on Differential Equations and Applications”, Universidad de Vigo, Ourense, 1–3 June 2016 (Invited)

P. DUARTE, *Isospectral Reduction in Infinite Graphs*, NTNU, Trondheim Science and Technical University August 19, 2016

National

C. REBELO, Plenary speaker, *Recent Results on Epidemiological Models and on Prey-Predator Models*, The Portuguese Meeting in Biomathematics (University of Beira Interior, October, 2016) (Invited)

A. MARGHERI, *Dinâmica do problema de Kepler com dissipação linear*, Centro de Matemática da Universidade do Porto (Março 2016) (Invited)

P. DUARTE, *Invariant manifolds for flows on polytopes*, CMUP, Universidade do Porto, April 29, 2016

P. DUARTE, *Invariant manifolds for flows on polytopes*, Seminário Multidisciplinar José Sousa Ramos, Universidade de Évora, June 15, 2016

Theses supervised (PhD, MSc)

1 completed MSc thesis.

2 ongoing MSc thesis.

Conferences and courses organized

Encontro Nacional da SPM (J. BUESCU, Presidente do Conselho Científico)

C. REBELO, A. MARGHERI, A. SIMÕES (Orgs)., *$E=MC^3$, a spring to summer event of three mini-courses on dynamics and differential equations*, DM-FCUL, Lisboa, 2016

Editorial activity

J. Buescu, Editor da Newsletter of the European Mathematical Society

Articles in proceedings

C. SERPA, J. BUESCU, *Bold play and timid play with multiple payoffs*, Proceedings of the Recreational Mathematics Colloquium IV, Gathering for Gardner Europe, Ludus, 2016. ISBN:978-989-99506-0-3

A. R. DOMINGOS, *Resolver problemas — uma atividade mágica!*, Bol. Soc. Port. Mat., Número especial, 29–32, 2016.

PEDRO DUARTE, SILVIUS KLEIN, Large deviation type estimates for iterates of linear cocycles, from “Probability in Dynamics”, Stochastics and Dynamics, 16, 3, 2016. www.worldscientific.com/doi/10.1142/S0219493716600108

Other

J. Buescu is chairman of Sociedade Portuguesa de Matemática since 2016.

Stochastic Analysis, Mathematical Physics and Applications

Communications in seminars or conferences

International

M.C. Carvalho, “Mathematical Topics in Kinetic Theory”, Cambridge University, U.K., May 9–13, 2016.

M.C. Carvalho, “Interactions Between Partial Differential Equations and Functional Inequalities”, Mittag-Leffler Institute, Djorsholm, Sweden, September 12–16, 2016. (Invited)

R.V. Mendes, “Signal processing on graphs: Transforms and tomograms”, Univ. Francisco de Vitória, Madrid, April 2016.

R.V. Mendes, “Inference, entropy and maximal entropy networks”, Univ. Autónoma, Madrid, April 2016.

R.V. Mendes, “Wavelets, wavelet networks and the conformal group”, Univ. Autónoma, Madrid, April 2016.

National

M.J. Ferreira, ENSPM - Meeting of the Portuguese Mathematical Society, Univ. Nova de Lisboa, July 11–13, 2016.

Conferences or courses organized

M.C. Carvalho organized with A.J. Soares e P. Goncalves from the University of Minho the conference “Systems and PDE’s V” that was held at the Centre of Mathematics of the University of Minho, in Braga, Portugal, from 28 to 30 November 2016.

Editorial activity

C. Bernido, M. V. Carpio-Bernido, M. Grothaus, T. Kuna, M. J. Oliveira, J. L. da Silva (eds.), *Stochastic and Infinite Dimensional Analysis*, Trends in Mathematics, Birkhäuser, 2016. ISBN:978-3-319-07244-9
www.springer.com/us/book/9783319072449

Book chapters

T. ARAÚJO, S. BANISCH, *Multidimensional Analysis of Linguistic Networks*, in Towards a Theory of Complex Linguistic Networks, Understanding Complex Systems, 107–131, Springer, 2016. [dx.doi.org/10.1007/978-3-662-47238-5](https://doi.org/10.1007/978-3-662-47238-5)

R. VILELA MENDES, *From market data to agent-based models and stochastic differential equations*, in *Particle Systems and Partial Differential Equations III*, Springer, 2016. label2.ist.utl.pt/vilela/Papers/Frac_vol_MinhoSP.pdf

R. VILELA MENDES, *Stochastic solutions of nonlinear PDE's and an extension of superprocesses*, in *Stochastic and Infinite dimensional Analysis*, Birkhäuser 2016. label2.ist.utl.pt/vilela/RVM-Publications.html

R. VILELA MENDES, *The stability of physical theories principle*, in *The Algebraic Way. Space, Time and Quantum Beyond Peaceful Coexistence*, I. Licata (Ed.), Imperial College Press, 2016. label2.ist.utl.pt/vilela/RVM-Publications.html

Mathematical Logic

Communications in seminars or conferences

International

F. FERREIRA, “Modified realizability and functional interpretations: some logical and mathematical observations”, *Proofs, Justifications, Certificates*, CIMI, Toulouse, France. (Invited) <http://www.cimi.univ-toulouse.fr/cippmi/en/workshop-ii-3-4th-june>

F. FERREIRA, “On some semi-constructive theories related to Kripke-Platek set theory”, *Mathematics for Computation*, Lower Bavaria, Germany. (Invited) <https://mathematics4computation.org/>

National

F. FERREIRA, “Categoricity proofs and mathematical knowledge”, *LanCog Seminar*, Faculdade de Letras da Universidade de Lisboa (Invited) <http://www.lancog.com/abstracts-1516.html>

Évora’s 7th Symposium on Philosophy and History of Science and Technology, Évora, Portugal
<http://ihc.fcsh.unl.pt/pt/agenda/item/40978-%C3%A9voras-7th-symposium-on-philosophy-andhistory-of-science-and-technology>

Theses supervised (Phd, MSc)

4 ongoing PhD thesis.

1 ongoing MSc thesis.

Conferences or courses organized

Journées sur les Arithmétiques Faibles, JAF 35, Lisboa, Portugal, 6–7 June 2016.
<http://jaf35.campus.ciencias.ulisboa.pt/> (F. Ferreira, member of the programme committee, member of the organizing committee.)

Thirteenth International Conference on Computability and Complexity in Analysis, Faro, Portugal, 15–17 June 2016. <http://cca-net.de/cca2016/> (F. Ferreira, member of the programme committee)

Sixth International Workshop on Classical Logic and Computation, Porto, Portugal, 23 June 2016.
<http://www.di.unito.it/~stefano/CL&C/CL&C16.htm> (F. Ferreira, member of the programme committee)

Articles in proceedings

N. HONDA, L. PRELLI, S. YAMAZAKI, *Multi-microlocalization*, RIMS Kokyuroku Bessatsu B57, 93–115, 2016.

Biomathematics and Statistics

Research projects

DENFREE, WP4: “Dengue research Framework for resisting Epidemics in Europe”. Leader: Nico Stollenwerk. From Jan. 2012 to Dec. 2016. Funding: 384 K€

Estudos actuariais com vista ao lançamento de um novo seguro de saúde com cobertura até 1 milhão de euros. Este projecto resulta de uma parceria entre a FCUL e a seguradora Multicare e pretende estudar as incidências, prevalências bem assim como os custos associados ao tratamento de doenças graves que, frequentemente, não obtêm toda a cobertura através dos seguros actualmente existentes no mercado. O estudo incide sobre dois tipos de doenças: oncológicas e cardiovasculares. O projecto é parcialmente financiado pela FCT, através de duas bolsas de Doutoramento em Empresa, e pela Multicare, que contribui com metade do valor das bolsas e com outras despesas como deslocações a conferências, aquisição de software e bases de dados, etc. Iniciou-se em Outubro de 2013 e está previsto terminar em Março de 2018. (PI: Teresa Alpuim)

Submissão da candidatura ao programa EIT Health (programa enquadrado no Horizon2020), no âmbito da obtenção de um labelling EIT. A candidatura foi aprovada, e o programa entra em funcionamento no ano lectivo 2016/17. Trata-se da leccionação de um módulo em conjunto com a Copenhagen Business School e a Faculdade de Medicina da Universidade de Copenhaga: Advanced Quantitative Tools for Health Care Innovation, no contexto do Mestrado Innovation in Health Care da Copenhagen Business School. (PI: Helena Mouriño & Isabel Barão)

Communications in seminars or conferences

International

N. STOLLENWERK, invited plenary talk CMMSE 2016, Cadiz.

N. STOLLENWERK, invited plenary talk, SIMOMATH 2016 in Makassar, and at Bandung University, Indonesia.

MAÍRA AGUIAR, invited plenary talk, SIMOMATH 2016 in Makassar, and at Bandung University, Indonesia.

N. STOLLENWERK, plenary talk at DSABNS 2016.

MAÍRA AGUIAR, DSABNS 2016.

LUIS MATEUS, contributed talk at DSABNS 2016.

PEYMAN GHAFARI, contributed talks at CMMSE 2016, Cadiz.

N. STOLLENWERK, at Dynamics Days 2016 (Corfu).

MAIRA AGUIAR, at Dynamics Days 2016 (Corfu).

N. STOLLENWERK, invited talk at Mahidol Uni Bangkok (2016).

MAIRA AGUIAR, invited talk at Mahidol Uni Bangkok (2016).

MAIRA AGUIAR, talks at major dengue fever conferences: Panama, Colombia (2016).

N. STOLLENWERK, talk at dengue fever conference in Paris (2016).

RAQUEL BARREIRA, “Cross-diffusion-induced patterns on evolving surfaces”, ECMTB2016, University of Nottingham, julho de 2016

RAQUEL BARREIRA, “Characterising the effects of cross-diffusion for reaction-diffusion models on stationary and evolving domains and surfaces, ECMI 2016, Santiago de Compostela, junho de 2016

PATRÍCIA A. JORGE, JESSICA W. SHAFFER, TIAGO A. MARQUES, HELENA MOURIÑO, LEN THOMAS, DAVID, J. MORETTI, NANCY DIMARZIO, *Estimating Blainville’s beaked whales abundance over time: improving dive counting methods*, II Galician-Portuguese Meeting of Biometry, 30 Junho – 2 Julho 2016, Santiago de Compostela, Espanha.

HELENA MOURIÑO, CLEBER IACK, *Generalized Linear Mixed Models for Binary Responses: Resignation from the Brazilian Army*, 9th International Conference of the ERCIM Working Group on Computation and Methodological Statistics (CMStatistics 2016), 9–11 Dezembro 2016, Sevilha, Espanha.

T. MAGALHÃES, S. LOPES, J.J. GOMES, *Study of the differences in mortality and length of hospital stay in acute myocardial infarction at hospital level*, 10th Workshop on Statistics, Mathematics and Computation (WSMC10), Statistical Models in Applied Sciences, Instituto Politécnico de Tomar, 27 May 2016.

T. MAGALHÃES, S. LOPES, J.J. GOMES, *Study of the differences in mortality and length of hospital stay in acute myocardial infarction at hospital level*, Workshop Management and Efficiency of Healthcare Organizations, Instituto de Higiene e Medicina Tropical and Universidade Nova de Lisboa, 27 Apr 2016.

PATRÍCIA A. JORGE, JESSICA W. SHAFFER, TIAGO A. MARQUES, HELENA MOURIÑO, LEN THOMAS, DAVID, J. MORETTI, NANCY DIMARZIO, *Estimating Blainville’s beaked whales abundance over time: improving dive counting methods*, II Galician-Portuguese Meeting of Biometry, Santiago de Compostela, Espanha, 30 Jun – 2 Jul 2016.

HELENA MOURIÑO, CLEBER IACK, *Generalized Linear Mixed Models for Binary Responses: Resignation from the Brazilian Army*, 9th International Conference of the ERCIM Working Group on Computation and Methodological Statistics (CMStatistics 2016), Sevilha, Espanha, 9 – 11 Dec 2016.

M. CASQUILHO, E. CAROLINO, R. RAMOS, ISABEL BARÃO, *Web computing of robust methods in Acceptance Sampling for Weibull variables*, COMPSTAT 2016, Oviedo, Espanha, 2016.

A. GUIMARÃES, P. VAZ-FERNANDES, M.R. RAMOS, A.P. MARTINHO, *Co-processing of hazardous waste in a cement industry in Brazil: the perception of workers regarding environmental, economic, social and health issues*, 22nd International Sustainable Development Research Society Conference (ISDRS), Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Jul 2016.

ELISABETE CAROLINO, M. ROSÁRIO RAMOS, CARLA VIEGAS, SUSANA VIEGAS, *Joint Control Charts applied to monitoring the concentration of particles with health effects in occupational environment*, 10th Workshop on Statistics, Mathematics and Computation (WSMC10), 5th Portuguese-Polish Workshop on Biometry (PPWB5), 26 – 28 May 2016.

National

RAQUEL BARREIRA, “Cross-diffusion-induced patterns for reaction diffusion systems”, Seventh Workshop Dynamical Systems Applied to Biology and Natural Sciences, Fev 2016

ANNY C. MUNIZ, DUARTE TAVARES, HELENA MOURIÑO, PAULO SILVA, MARÍLIA MARQUES, MARGARIDA NARCISO, *Caracterização dos hábitos tabágicos dos alunos nas escolas de Alcochete, Barreiro, Moita e Montijo*, Workshop: “Valorizar o Papel das Pessoas Não Fumadoras”, Setúbal, 17 Nov 2016. (Convidados)

T. MAGALHÃES, S. LOPES, J.J. GOMES, F. SEIXO, *Acute Coronary Syndromes in Portugal. Economical perspective. Gender differences in mortality and length of hospital stay in acute myocardial infarction (AMI)*. Associação Portuguesa de Intervenção Cardiovascular (APIC), Reunião anual, Figueira da Foz, 4 Nov 2016.

J.J. Gomes, *Estatística vs. doença mental. Seminário “O que é a doença mental?”* organizado pelo serviço de psiquiatria geral e transcultural do Centro Hospitalar Psiquiátrico de Lisboa, 5 Jul 2016. (Invited)

Theses supervised (PhD, MSc)

7 ongoing PhD thesis.

17 completed MSc thesis.

5 ongoing MSc thesis.

Conferences or courses organized

DSABNS – 7th Workshop Dynamical Systems Applied to Biology and Natural Sciences, Escola de Ciências e Tecnologia, Universidade de Évora, Portugal, 2–5 Feb 2016. <http://dsabns2016.fc.ul.pt>

10th Workshop on Statistics, Mathematics and Computation (WSMC10) | 5th Portuguese-Polish Workshop on Biometry (PPWB5). Instituto Politécnico de Tomar, Tomar, 26 a 28 de maio de 2016. Encontro promovido por: Universidade Aberta(UAb), Instituto Politécnico de Tomar(IPT), Poznan University of Life Sciences (PULS),CEAUL, CMA-UBeira Interior (UBI), CIMA-UÉvora e Centro de Matemática da Universidade de Coimbra (CMUC). M. Rosário Ramos, membro da comissão Organizadora e da Comissão Científica. conferencessat.wixsite.com/wsmc10ppwb5

Editorial activity

DSABNS Book of Abstracts. Seventh Dynamical Systems Applied to Biology and Natural Sciences: DSABNS 2016 Book of Abstracts. Conference Proceedings, 2016. ISBN:978-989-98750-2-9 edited by Maíra Aguiar, Portugal.

MAÍRA AGUIAR, CARLOS BRAUMANN, BOB W. KOOI, ANDREA PUGLIESE, NICO STOLLENWERK, Preface Special Issue “Dynamics in Bio-Systems” (DSABNS 2016), Ecological Complexity, 2016. DOI:10.1016/j.ecocom.2017.01.001

Articles in proceedings

RAQUEL FILIPE, NICO STOLLENWERK, LUÍS MATEUS, PEYMAN GHAFARI, SCOTT HALSTEAD, MAÍRA AGUIAR, *Effective infection rate in SIR-type models from models with symptomatic and asymptomatic infection*. Proceedings of the 16th International Conference on Mathematical Methods in Science and Engineering, CMMSE, 1060–1072, 2016. ISBN:978-84-617-2230-3 edited by Jesus V.A. et al., Cadiz, Spain.

PABLO FUENTES SOMMER, NICO STOLLENWERK, BOB KOOL, LUÍS MATEUS, PEYMAN GHAFARI, MAÍRA AGUIAR, *Lyapunov spectra for torus bifurcations and ways to deterministic chaos in population biology*. Proceedings of the 16th International Conference on Mathematical Methods in Science and Engineering, CMMSE, 1060–1072, 2016. ISBN:978-84-617-2230-3 edited by Jesus V.A. et al., Cadiz, Spain.

A. GUIMARÃES, A.P. VAZ-FERNANDES, M. R. RAMOS, A.P. MARTINHO, *Co-processing of hazardous waste in a cement industry in Brazil: the perception of workers regarding environmental, economic, social and health issues*, 22nd International Sustainable Development Research Society Conference (ISDRS 2016), Lisboa, 15–17. Ed. International Sustainable Development Research Society (ISDRS 2016) and CENSE, pp. 94–107. ISBN: 978-972-674-791-8. Vol. 3.

Posters

CLEBER IACK, HELENA MOURIÑO, *Resignation in the Brazilian Army: A Logistic Regression Model*, Royal Statistical Society (RSS) 2016 International Conference, 5–8 Setembro 2016, Manchester, UK.

HELENA MOURIÑO, PAULO DARIO, ANA RITA OLIVEIRA, ISABEL LUCAS, TERESA RIBEIRO, MARIA JOÃO PORTO, JORGE COSTA SANTOS, DEODÁLIA DIAS, FRANCISCO CORTE REAL, *The multinomial logistic regression model to predict eye color: An application to the Portuguese case*, 9th International Conference of the ERCIM Working Group on Computation and Methodological Statistics (CMStatistics 2016), 9–11 Dezembro 2016, Sevilha, Espanha.