3o. ENCONTRO IST-IME
EQUAÇÕES DIFERENCIAIS ORDINÁRIAS E PARCIAIS
E TÓPICOS RELACIONADOS
13 A 17 DE SETEMBRO DE 2010

BOOK OF ABSTRACTS

Stability of Gradient Semigroups Under Perturbations

ALEXANDRE NOLASCO DE CARVALHO
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ABSTRACT: In this work we give conditions under which gradient semigroups in a general metric space are stable under perturbation. This is done by proving that gradient-like semigroups in the sense defined in [1] are gradient semigroups (possess a Lyapunov function). The results are inspired by the works of [1] and on the Morse decomposition of invariant sets as in [2], [3].
This is a joint work with E. Aragão-Costa (ICMC-USP), J. A. Langa (Universidade de Sevialha) e T. Caraballo (Universidade de Sevialha).
[1] A. N. Carvalho and J. A. Langa, *An extension of the concept of gradient semigroups which is stable under perturbation*, J. Differential Equations 246 (2009), 2646–2668.
[2] C. Conley, *Isolated invariant sets and the Morse index*. CBMS Regional Conference Series in Mathematics, 38. American Mathematical Society, Providence, R.I. (1978).
[3] K. P. Rybakowski, *The homotopy index and partial differential equations*, Universitext, Springer-Verlag (1987).

Construction of a measure attaining the Ornstein distance between pairs of ordered binary chains of infinite order

ANTÔNIO GALVES
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ABSTRACT:We solve in a constructive way the problem of finding a measure attaining the Ornstein distance between pairs of ordered binary chains of infinite order. This is equivalent of solving the

Monge-Kantorovich problem for a particular class of coust functions. The result follows from a representation of the coupled pair of chains as a concatenation of finite random strings, which are independent and identically distributed. This is a joint work with N.L. Garcia and C. Prieur.

Sturm Global Attrators of Hamiltonian type

CARLOS ROCHA
IST-UTL

ABSTRACT: The permutation characterization for the global attractors of the semiflows generated by Neumann boundary value problems of the form $u_t = u_{xx} + f$ on the interval $0 \leq x \leq \pi$ equations is well known in the case of dissipative nonlinearities $f = f(x, u, u_x)$. We present a permutation characterization for the global attractors in the restrictive class of nonlinearities $f = f(u)$. In this class the stationary solutions of the parabolic equation satisfy the second order ODE $v'' + f(v) = 0$ and the permutation characterization is obtained from a characterization of the set of 2π-periodic orbits of this planar Hamiltonian system.

Mean field limit of a continuous time finite state game

DIOGO GOMES
IST-UTL

ABSTRACT: Mean field games is a recent area of research introduced by P. L. Lions and J. M. Lasry whose objective is to study situations with a very large number of competing agents. In general, models with a finite but large number of agents are intractable form both the mathematical and practical point of view. However, in several situations one can derive mean-field or effective equations that describe these processes. In this talk we consider the limit as the number N of players increases to ∞ of systems in which the players can be in a finite number of states. We assume the players can act on its state by controlling the switching rate of a continuous time Markov chain. We show that under reasonable hypothesis the systems converges to a mean field limit which is described by a system of coupled ordinary differential equations. This is a joint work with J. Mohr and R. R. Souza from the Universidade Federal do Rio Grande do Sul.

On the Henon Problem

DJAIRO GUEDES DE FIGUEIREDO
IMECC-UNICAMP

ABSTRACT: Equações Elípticas Semilineares com peso de Henon: existência. multiplicidade e regularidade de soluções.

David homeomorphisms via Carleson boxes

EDSON DE FARIA
IME-USP

ABSTRACT:David homeomorphisms are very useful generalizations of quasi-conformal mappings introduced by G. David in 1988. They were used for the first time in complex dynamics by P. Haïssinski to perform parabolic surgery on rational maps, and later by C. Petersen and S. Zakeri in their study of quadratic polynomials with Siegel disks.
In this talk we answer a question posed by S. Zakeri some time ago, concerning the boundary values of such homemorphisms. We construct a family of examples of increasing homeomorphisms of the real line whose local quasi-symmetric distortion blows up almost everywhere, which nevertheless can be realized as the boundary values of David homeomorphisms of the upper half-plane. The construction of such David extensions uses Carleson boxes and a Borel-Cantelli argument.

The talk is based on a paper with the same title, to appear in the Annales Academiae Scientiarum Fennicae.

A Minimization Problem For The Nonlinear Schrodinger-Poisson Type Equation

GAETANO SICILIANO
UNIVERSIDADE DE SAO PAULO E POLITECNICO DI BARI (ITALIA)

ABSTRACT:We show the existence of orbitally stable standing waves with prescribed L^2 norm for a nonlinear Schrodinger-Poisson type equation in $\mathbb{R}^3$. The related functional is invariant for the noncompact group of translations; so a concentration compactness principle is used to prove the compactness of the (constrained) minimizing sequences of the functional.

An asymptotic formula for drop voltage in power distribution networks of some chips

JOAN SOLA-MORALES
UNIVERSITAT POLITÈCNICA DE CATALUNYA

ABSTRACT: We will present a new formula for the maximum voltage drop in a simple on-chip distribution network where all the pads have size 2ε. It is obtained by solving a Poisson equation in a domain whose boundary changes with ε. In comparison with the formula that appears in the electronic literature (K. Shakeri, J.D. Meindl, Compact Physical IR-Drop Models for Chip/Package Co-Design of Gigascale Integration (GSI), IEEE Transactions on Electron Devices 52 (6) (2005), 1087-1096), our formula is more complete, its first terms have been computed analytically, and not only numerically, and a procedure to compute even larger order terms is presented. This procedure can be interpreted as either using multipole solutions or else partial differential equations involving spatial derivatives of δ-functions. Throughout the paper we use the techniques of Asymptotic Analysis. (This is joint work with M. Aguareles, J. Haro and J. Rius).

Bifurcations in the differential equations for the motion under focal attraction and radial drift in rotating medium

JORGE SOTOMAYOR TELLO
IME-USP

ABSTRACT: In this lecture we will present an extension of the one parameter family studied in

J. Sotomayor “On the motion under focal attraction in a rotating mediu”, Bulletin of the Belgian Math. Society Simon Stevin, 15 (2008), 921-925.

Particular attention will be given to description of the singularites their stability and bifurcations around the organizing centers (i.e. codimension 2 parameters) of the family. The historical motivation for this study will be discussed.
Work in collaboration with L. F. Mello (UNIFEI).

A dimension reduction result in the context of structured deformations

JOSÉ MATIAS
IST-UTL

ABSTRACT: One of the fundamental challenges of current research in continuum mechanics is to accurately describe the mechanical properties of thin structures (like plates, shells, membranes and rods). This has led to an extensive search for rigorous derivations of lower dimensional models through dimension reduction techniques. From the mathematical point of

view Γ-convergence has been proved to be a relevant tool for the derivation of such models. The theory of structured deformations, introduced in [2] and later generalized in [3], provides a model for non-classical deformations of continua for which a distinct analysis at both macroscopic and microscopic levels is required in order to take into account smooth changes as well as disarrangements. A model for structured deformations in the framework of special functions of bounded variation was developed in [1]. We present a model suitable for 2-D thin structures derived in the context of structured deformations through dimension reduction techniques (joint work with Pedro Miguel Santos) which relies on a relaxation result in the BV setting (joint work with Margarida Baía and Pedro Miguel Santos).

[1] Choksi-Fonseca. *Bulk and Interfacial Energies for Structured Deformations of Continua*, Arch. Rational Mech. Anal. 138 (1997), 37-103.
[2]Del Piero-Owen, *Structured Deformations of Continua*, Arch. Rational Mech. Anal. 124 (1993), 99-155.
[3] Owen-Paroni. *Second-order structured deformations*, Arch. Rational Mech. Anal. 155 (2000), 215-235.

Birkhoff's Ergodic Theorem

LUIS BARREIRA
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ABSTRACT: By Birkhoff's ergodic theorem, for any dynamics preserving a finite invariant measure, the average of an integrable function is well defined along almost every orbit. However, for large classes of dynamics the set of points for which these averages do not exist may be large from the points of view of topological entropy and Hausdorff dimension. Using examples from symbolic dynamics and hyperbolic dynamics, I want to illustrate this and other peculiar phenomena beyond the apparent simplicity of Birkhoff's ergodic theorem. In particular, one can consider local quantities such as local entropies, pointwise dimensions, and Lyapunov exponents. The necessary material from dimension theory and multifractal analysis will be recalled along the way.

On Stacked Planar Central Configurations

LUIS FERNANDO MELLO
INSTITUTO DE CIÊNCIAS EXATAS, UNIVERSIDADE FEDERAL DE ITAJUBÁ

ABSTRACT: A planar central configuration in the n–body problem is called *stacked* if there is a proper subset of the n bodies already on a central configuration. In this talk some new results on the stacked planar central configurations in the 5–body problem will be presented.

A control model of fractones in neurulation

MARCELO H. KOBAYASHI, MONIQUE CHYBA, FREDERIC MERCIER
UNIVERSITY OF HAWAII AT MANOA

ABSTRACT: Neurulation and the dynamics of brain formation are complex and fundamental problems in neurosciences. In this talk, a novel model of the morphogenesis based on a dynamical control theory is proposed. This approach opens new and promissing avenues of research in neuroscience modeling and control. Some preliminary results are examined that shows the suitability of the proposed model.

Uma visão estocástica de dinâmicas determinísticas

MARCELO VIANA
IMPA

ABSTRACT: Sistemas dinâmicos determinísticos podem, frequentemente, ser melhor estudados de um ponto de vista estocástico: ao invés de trajetórias individuais é focalizada a ação do sistema nas distribuições de massa (probabilidades) no espaço de fases, bem como a estabilidade dessa ação sob perturbações da lei de evolução. Descreveremos alguns dos instrumentos e resultados desta teoria.

Singularities of Refracted Vector Fields

MARCO A. TEIXEIRA
IMECC-UNICAMP

ABSTRACT: In this talk we discuss a class of 3D non-smooth vector fields (NSVF) named Refracted Systems. Those systems are discontinuous and the set of discontinuities are concentrated on a surface. We present a general discussion on Filippov systems before the analysis of typical singularities that occur generically for one parameter families of refracted vector fields.

Decomposição focal

MAURÍCIO PEIXOTO
IMPA

ABSTRACT: Faremos uma apresentação sucinta desse assunto mostrando como ele se relaciona naturalmente com vários tópicos de Matemática e de Física.

Scalar-flat Kaehler metrics on non-compact toric 4-manifolds

MIGUEL ABREU
IST-UTL

ABSTRACT: I will describe an explicit construction of scalar-flat Kaehler metrics on non-compact toric 4-manifolds and apply it to obtain old and new interesting examples. This construction is in symplectic action-angle coordinates and determines scalar-flat toric Kaehler metrics via symplectic potentials satisfying a non-linear fourth order PDE. It is based on recent work of Donaldson showing how a method of Joyce can be used to obtain such symplectic potentials from solutions to a linear second-order PDE.
This is joint work with Rosa Sena-Dias.

Rigidity and Bifurcation in Equivariant Geometrical Variational Problem

PAOLO PICCIONE
IME-USP

ABSTRACT: I will discuss an equivariant implicit function theorem with low regularity assumptions, and an equivariant bifurcation result for continuous Lie group actions. These results are suitable for a class of geometrical variational problems, including minimal and CMC hypersurfaces, semi-Riemannian geodesics and harmonic maps.

Vetores Gevrey em Estruturas Localmente Integráveis

PAULO DOMINGOS CORDARO
IME-USP

ABSTRACT: Nesta palestra apresentaremos a noção intrínseca de Vetores Gevrey definidos em uma estrutura involutiva localmente integrável, bem como resultados sobre sua regularidade analítica e

Gevrey. Apresentaremos, também, a aplicação desta noção ao estudo da regularidade de soluções de certas classes de sistemas semi-lineares. Estes resultados foram obtidos em trabalhos em colaboração com Rafael Barostichi e Gerson Petronilho (UFSCar, São Carlos, Brasil) e Jairo Castellanos (Universidade de Antioquia, Medellin, Colombia).

O Problema Inverso do Cálculo de Variações para integrais múltiplos

PEDRO GONÇALVES HENRIQUES
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ABSTRACT: We will discuss the so-called mixed endpoint conditions for variational problems with non-holonomic constraints given by form actions of order greater than one. We will present some results and discuss the inverse problem of Calculus of Variations.

A continuum of periodic orbits of the Kaldor-Kalecki trade cycle model

PLÁCIDO Z. TABOAS, MIGUEL V. S. FRASSON, MARTA C. GADOTTI, SELMA H. J. NICOLA AND PLÁCIDO Z. TÁBOAS
ICMC-USP

ABSTRACT: The Kaldor-Kalecki model is a delay differential system inspired in the renowned Kaldor's trade cycle model. Under a policy where the savings equal the part of the investment which depends on the income we obtain a global continuation of a branch of bifurcating periodic solutions. The delay is a constant inherent to the specific economy and the adjustment coefficient in the goods market is the bifurcation parameter α.

Linhas assintóticas de superfícies em S^3 e P^3

RONALDO ALVES GARCIA
UFG

ABSTRACT: O objetivo será apresentar propriedades globais das linhas assintóticas em superfícies imersas em S^3 e P^3. Em particular será discutido a conjectura proposta por S. Tabachnikov sobre o número de pontos de inflexões para as duas folheações assintóticas globalmente definidas no toro T^2 imerso em S^3 ou P^3.

A universal stability theorem

RUI LOJA FERNANDES
IST-UTL

ABSTRACT: I will explain a new stablity theorem which extends and provides a new approach (and proofs) to the classical stability results for flows, foliations and group actions. This is joint work with Marius Crainic (Utrecht).

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