Uma breve introdução as equações diferenciais parciais estocásticas.

Pedro Catuogno - UNICAMP

As equações diferenciais estocásticas são utilizadas para modelar sistemas sujeitos a ruidos internos, externos o do meio. A presença do ruido cria novos fenomenos com uma ampla variedade de exemplos nas ciencias aplicadas. O proposito desta charla é presentar as ferramentas matematicas basicas para descrever as equacoes diferenciais estocasticas parciais, com especial enfase na equação estocastica de Burgers (fluidos) e a equação KPZ (dinamica de interfases).

Minimality of the strong stable and unstable foliations of transitive partially hyperbolic diffeomorphisms.

Thiago Catalan - UFU

We show that a generic partially hyperbolic conservative or symplectic diffeomorphism has the m-minimality property. That is, m-almost every point has strong stable and unstable leafs dense in M. Furthermore, we will discuss which dynamic properties m-minimality implies (This is joint work with Alexander Arbieto e Felipe Nobili (in progress)).

Rational global surfaces of section in the restricted three body problem

Pedro Salomão – IME/USP

In this talk I will discuss some dynamical results in the circular planar restricted three body problem. For low values of energy, the bounded component near the light primary can be regularized as a 3-dimensional real projective space and for large mass ratios, the flow is dynamically convex. Using tools from symplectic dynamics we show that the flow on such a regularized component admits a rational disk-like global surface of section. Moreover, the retrograde orbit found by Birkhoff, in this range of parameters, can be chosen to be the boundary of such a global surface of section. This implies, in particular, the existence of a direct orbit. This is joint work with U. Hryniewicz (UFRJ).

Mini Course: Anosov systems: diffeomorphisms, flows and actions

Thierry Barbot

This serie of lecture is devoted to classical, but also actualized, results on Anosov systems. There will be three sessions:

I. Anosov diffeomorphisms and flows,
II. Anosov representations of hyperbolic groups in Lie groups,
III. Anosov actions of nilpotent Lie groups.

The goal is to provide an introductory overview on the topic, insisting on the construction of examples, and mentioning some open questions in the field.

Conjectures and counterexamples in systolic geometry

Umberto Hryniewicz

How small is the smallest action of closed trajectories of a Reeb vector field? This question is in the intersection of dynamical systems, systolic geometry and contact geometry. For instance, it covers the following question: How short is the shortest closed geodesic in some Riemannian (or Finsler) space? In this talk I'll explain some recent results and their relations to a conjecture of Viterbo. This is work in collaboration with Alberto Abbondandolo, Barney Bramham and Pedro A. S. Salomão.

Invariant foliations near hyperbolic fixed points and applications

Joachim Weber

Consider the (forward) heat (semi-)flow on the loop space of a closed Riemannian manifold. We review a construction of invariant foliations near a hyperbolic fixed point parametrized by the local unstable manifold, the center leaf being the local stable manifold. One can think of the collection of leaves as a topological thickening of the local stable manifold. It is useful to equip each leaf, via conjugation, with a copy of the flow on the local stable manifold.

The advantage is that such 'dynamical thickening' removes the notorious discontinuity of the trajectory endpoint map. As a first application we illustrate this in the finite dimensional case of a downward gradient flow of a Morse function by indicating a short and conceptually simple proof of the classical cell attachment theorem in Morse theory.

Another (potential) application is to extend towards parabolic PDEs Rot-Vandervorst's recent Conley homology theory [arXiv:1305.4074] which lives in finite dimensions and is based on the construction of Morse homology via hyperbolic dynamical systems (lambda-lemma and Grobman-Hartman theorem).

Counting closed orbits of Anosov flows in free homotopy classes

Sergio Fenley - Florida State University

This is joint work with Thomas Barthelme of Penn State University.

There are many Anosov and pseudo-Anosov flows so that some orbits
are freely homotopic to infinitely many other orbits.
A free homotopy class is a maximal collection
of closed orbits of the flow that are pairwise freely homotopic to each other.
We first describe explicit examples of Anosov flows with
some infinite free homotopy classes.

Then we talk about analyzing growth of length of orbits
in a fixed infinite free homotopy class.
We analyse the interaction of such a free homotopy class with
the torus decomposition of the manifold: for examples whether all orbits in
the infinite free homotopy classes are contained
in a Seifert piece or atoroidal piece. There is a natural
ordering of an infinite subset of such a collection, indexed as (gamma_i).
We analyse the growth of the length of gamma_i as a function of i.
We obtain several inequalities: for example if the manifold is hyperbolic
then the growth of length of gamma_i is exponential. These
inequalities have consequences for the ergodic theory of the Anosov flow.

Symplectic reduction of symmetric Tonelli Hamiltonians

Mario Jorge Dias Carneiro- UFMG

We consider Tonelli Hamiltonians (i.e. fiberwise convex and superlinear) on the cotangent bundleof a smooth manifold which are invariant by the lifted action of a Lie group. We describe some dynamical features (Weak KAM solutions, critical values and Mather sets) using symplectic reduction. We discuss the explicit example of the 2-body problem on the hyperbolic plane.

This is a joint work with Justino Nunes (UFV-Flarestal) and Matthew Perlmutter (UFMG)