

WORKSHOP ON SUBMANIFOLD THEORY AND GEOMETRIC ANALYSIS

UFSCAR, SÃO CARLOS, BRAZIL, AUGUST 05 – 09, 2019

FRIDAY- 9h - 9:40h -AUDITÓRIO DO DM

Leonardo Biliotti

(University of Parma, Italy)

Meromorphic limits of automorphisms

ABSTRACT. Let X be a compact complex manifold in the Fujiki class C . We study the compactification of the connected component of $Aut(X)$ given by its closure in Barlet cycle space. The boundary points give rise to non-dominant meromorphic self-maps of X . Moreover convergence in cycle space yields convergence of the corresponding meromorphic maps. There are analogous compactifications for reductive subgroups acting trivially on $AlbX$. If X is Kähler, these compactifications are projective. Finally we give applications to the action of $Aut(X)$ on the set of probability measures on X . In particular we obtain an extension of Furstenberg lemma to manifolds in the class C . (This is a joint work with Prof. Alessandro Ghigi of University of Pavia).

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FRIDAY- 10:20h - 11h -AUDITÓRIO DO DM

Ronaldo Freire de Lima

(UFRN, Brazil)

On vertical helicoids and mean isocurved hypersurfaces of product spaces

ABSTRACT. In this talk, we will present some results from a recent joint work with Pedro Roitman. We will consider immersed spacelike hypersurfaces of product spaces $M \times \mathbb{R}$; where M is an arbitrary Riemannian manifold, whose mean curvatures with respect to the standard Riemannian and Lorentzian product metrics coincide. We call them mean isocurved. We will introduce special hypersurfaces in $M \times \mathbb{R}$ which we call vertical helicoids, and then prove that they are minimal local graphs of harmonic functions and also that they are the only hypersurfaces of $M \times \mathbb{R}$ with these properties (besides horizontal sections $M \times \{t\}$). Furthermore, spacelike vertical helicoids will be shown to be zero mean isocurved in $M \times \mathbb{R}$ and unique with respect to this property as well. Finally, we will establish that, for any simply connected space form \mathbb{Q}_c^n of constant curvature c ; there exists a one-parameter family of complete minimal hypersurfaces of $\mathbb{Q}_c^n \times \mathbb{R}$ such that each member of this family contains a zero mean isocurved vertical helicoid.

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FRIDAY- 11:10h - 11:50h -AUDITÓRIO DO DM

Abigail Folha

(UFF, Brazil)

Entire H -graph in $\mathbb{H} \times \mathbb{R}$

ABSTRACT. We give necessary and sufficient conditions to the existence of graphs defined over unbounded domains having constant mean curvature $0 < H < 1/2$ and infinite boundary values in $\mathbb{H} \times \mathbb{R}$. Using the existence of such graphs we construct entire H -graphs in $\mathbb{H} \times \mathbb{R}$ that are parabolic and not invariant by one parameter groups of isometries of $\mathbb{H} \times \mathbb{R}$. Their asymptotic boundaries are $(\partial_\infty \mathbb{H}^2) \times \mathbb{R}$; they are dense at infinity.

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FRIDAY- 14h - 14:30h -AUDITÓRIO DO DM

João Paulo dos Santos

(UNB, Brazil)

Reduction of PDEs and applications to geometric problems

ABSTRACT. In this talk, it will be presented applications of Lie symmetries and reduction of PDEs to find solutions of geometric problems such as the prescribed Ricci tensor, Einstein equations, Ricci solitons and conformally flat hypersurfaces.

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FRIDAY- 14:40h - 15:10h -AUDITÓRIO DO DM

Sérgio Almaraz

(UFF, Brazil)

Spacetime positive mass theorems for initial data sets with
noncompact boundary

ABSTRACT. We define an energy-momentum vector at the spatial infinity of either asymptotically flat or asymptotically hyperbolic initial data sets carrying a noncompact boundary. Under suitable dominant energy conditions imposed both on the interior and along the boundary, we prove the corresponding positive mass inequalities under the assumption that the underlying manifold is spin. This a joint work with Levi Lopes de Lima (UFC) and Luciano Mari (Università degli Studi di Torino).

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FRIDAY- 15:20h - 15:50h -AUDITÓRIO DO DM

Stefano Nardulli

(UFABC, Brazil)

Existence of multiple constant mean curvature boundaries of small enclosed volume in compact Riemannian manifolds

ABSTRACT. In this paper we want to give a result on the existence and the number of constant mean curvature hypersurfaces being the boundary of domains enclosing a small amount of volume inside a compact Riemannian manifold M^n without boundary. We give a lower bound on this number in terms of the topological invariants of M . We do it using the classical relation between constant mean curvature hypersurfaces and the solutions of the Van der Waals-Cahn-Hilliard two phase transition equation with volume constraint, i.e., the following nonlinear problem: for fixed $V, \varepsilon \in \mathbb{R}^+ =]0, +\infty[$, find a pair $(u_{\varepsilon,V}, \lambda_{\varepsilon,V})$ with $u_{\varepsilon,V} \in H^1(M)$, and $\lambda_{\varepsilon,V} \in \mathbb{R}$ such that

$$-\varepsilon \Delta u_{\varepsilon,V} + \frac{1}{\varepsilon} W'(u_{\varepsilon,V}) = \lambda_{\varepsilon,V}, \tag{P_{\varepsilon,V}}$$

$$\int_M u_{\varepsilon,V}(x) dv_g = V > 0,$$

where M^n is a compact Riemannian manifold without boundary of dimension n , W is a double well potential regular enough and satisfying suitable growth conditions at infinity. Then the abstract topological method of photography is applied to the Problem $(P_{\varepsilon,V})$, for small $0 < \varepsilon, V \ll 1$. Finally we send the temperature parameter $\varepsilon \rightarrow 0^+$ for a fixed small $0 < V$ to find suitable limit characteristic BV -functions of sets of finite perimeter with suitable boundary regularity properties such that the modulus of the generalized mean curvature vector is constant. This is a joint work with Vieri Benci (Univ. Pisa), Luis Eduardo Osorio Acevedo (IME-USP), Paolo Piccione (IME-USP).

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FRIDAY- 16:30h - 17:10h -AUDITÓRIO DO DM

Álvaro K. Ramos

(UFRGS, Brazil)

Moves Preserving hyperbolicity of link complements

ABSTRACT. Given a link Γ in a 3-manifold P such that the complement $P \setminus \Gamma$ admits a complete hyperbolic metric of finite volume, we provide two potential alterations to the link, called the Chain Move and the Switch Move, that preserve hyperbolicity of the complement, with only a few manifold-link pair exceptions. Using such moves, we prove that any surface with admissible finite topology (i.e. negative Euler characteristic) can be realized as a properly embedded, totally geodesic surface in some complete hyperbolic 3-manifold of finite volume. Joint work with C. Adams and W. Meeks.

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FRIDAY- 17:20h - 18:00h -AUDITÓRIO DO DM

Waley Santos

(UFRJ, Brazil)

The functional L^2 -norm of the second fundamental form

ABSTRACT. We consider critical points of the functionals Π and Ψ defined as the global L^2 -norm of the second fundamental form and the traceless second fundamental form of isometric immersions of compact Riemannian manifolds into a background Riemannian manifold, respectively, as functionals over the space of deformations of the immersion. We will discuss the properties of their critical points in some special cases.

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