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SEMINÁRIO DE SISTEMAS DINÂMICOS

Dia 7 de Outubro (sexta-feira), às 14H30, na sala 6.2.38

On Taken's Last Problem: times averages for heteroclinic attractors

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Abstract:

In this talk, after introducing some technical preliminaries about the topic, I will discuss some properties of a robust family of smooth ordinary differential equations exhibiting tangencies for a dense subset of parameters. We use this to find dense subsets of parameter values such that the set of solutions with historic behaviour contains an open set. This provides an affirmative answer to Taken's Last Problem (F. Takens (2008) *Nonlinearity*, 21(3) T33--T36). A limited solution with historic behaviour is one for which the time averages do not converge as time goes to infinity. Takens' problem asks for dynamical systems where historic behaviour occurs persistently for initial conditions in a set with positive Lebesgue measure. The family appears in the unfolding of a degenerate differential equation whose flow has an asymptotically stable heteroclinic cycle involving two-dimensional connections of non-trivial periodic solutions. We show that the degenerate problem also has historic behaviour, since for an open set of initial conditions starting near the cycle, the time averages approach the boundary of a polygon whose vertices depend on the centres of gravity of the periodic solutions and their Floquet multipliers.

This is a joint work with I. Labouriau (University of Porto).

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