A GLOBAL STUDY OF 2D DISSIPATIVE 
DIFFEOMORPHISMS WITH A 
HOMOCLINIC FIGURE-EIGHT

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We consider 2D diffeomorphisms having a dissipative saddle and a figure-eight formed by its manifolds. They are simplified models of phenomena with forcing and dissipation. Under generic perturbations the manifolds can split undulate. This gives rise to different transversal homoclinic points and to a large set of bifurcations.

It should be emphasized that a main goal is to figure out the global behavior. Not only what happens close to a given bifurcation, but to study which kind of dynamical phenomena appear in a fundamental domain which captures all the non-trivial facts.

We will present the main tools to study the bifurcation diagram (topological methods, quadratic and cubic tangencies, return maps, cascades of sinks,...) giving rise to different kinds of attractors.

The analysis is illustrated by the numerical study a model which, despite being simple, has a “universal” character. All the phenomena predicted by the theoretical analysis are seen to be realized in the model.

Directions for future work will be outlined.

This is a joint work with S. Gonchenko and A. Vieiro.