GLOBAL INSTABILITY IN STRONGLY DEGENERATE REAL-ANALYTIC HAMILTONIANS

We will discuss a set of tools to study how the local instability created by weakly normally hyperbolic invariant objects can accumulate, and induce global instability, in close to integrable real-analytic Hamiltonians which present a strong degeneracy. Namely, we consider systems in which there exist a weakly normally hyperbolic manifold foliated by periodic orbits. As we will see, these systems appear naturally in Celestial Mechanics.

For real-analytic Hamiltonians which only present weakly hyperbolic invariant objects (e.g. perturbations of Arnold-Liouville integrable Hamiltonians), proving the existence of global instability via the so-called Arnold's mechanism is a formidably difficult task. We will see how, for systems with degeneracies, one can bypass some of the difficulties present in the general case. On the other hand, we develop new techniques to handle the extra difficulties that the presence of degeneracies brings.

Our main result consists on the application of these techniques to show that there exist global instability in the restricted 3-body problem for any value of the masses (except equal). This is joint work with M. Guàrdia and T.M Seara.