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Title: Methods of Geometric Control in the Arnold Diffusion Problem

Abstract: We apply techniques from control theory to the Arnold mechanism of diffusion.

We consider an integrable Hamiltonian system with singularities subject to a small, time-periodic perturbation. More precisely, we assume that the unperturbed system has a normally hyperbolic invariant manifold (NHIM), which persists under small perturbations, such that the stable and unstable manifolds of the perturbed NHIM have transverse intersections. Associated to each transverse intersection one can define a scattering map, that gives the future asymptotic of a homoclinic orbit as a function of its past asymptotic. We assume that we have a system of such scattering maps.

We provide results on the geometric controllability of the system. Under explicit conditions on the inner dynamics (the dynamics restricted to the NHIM) and on the scattering maps, given any two points on the NHIM (or in an open set of it), there is an orbit of the Hamiltonian flow that goes from a small neighborhood of the first point to a small neighborhood of the second point. Also, given any path on the NHIM, there is an orbit of the Hamiltonian flow that shadows that path.

This is joint work with R. de la Llave and T. M-Seara.