A geometric mechanism of Arnold diffusion in the a priori stable case

Marian Gidea [1], J-P. Marco[2]

[1] Yeshiva University

[2] Institut de Mathématiques de Bordeaux

We consider the a priori stable case of the Arnold diffusion problem, for nearly integrable, 3-degrees of freedom Hamiltonian systems. We show the existence of trajectories that follow prescribed sequences of simple resonances. In this present work, we assume the existence of chains of 3-dimensional normally hyperbolic invariant cylinders with boundary, along the simple resonances, which admit homoclinic and heteroclinic connections. The existence of such chains was proved in a work by J-P. Marco. We prove the existence of diffusing orbits drifting along such chains, under precise conditions on the dynamics on the cylinders, and on their homoclinic/heteroclinic structures. Our approach is based on geometric/topological methods that allow for an algorithmic construction of diffusing orbits. The mechanism outlined here is in agreement with numerical experiments by Gelfreich, Simo, and Vieiro.