ICM 1998, Berlin, Aug. 18–27

Abstracts of Plenary and Invited Lectures

Section:

9. Ordinary Differential Equations and Dynamical Systems

1991 MS Classification: 34 58 70
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Arnold diffusion and variational construction of connecting orbits

We use variational method to study Arnold diffusion and instabilities in high dimensional Hamiltonian systems. Our method is based on a generalization of Mather's theory on twist maps and their connecting orbits to a higher dimensional setting. Under some general nondegeneracy conditions, which can be verified in *a priori* unstable systems, for example, by the so-called Melnikov functions, we can construct transition chains of arbitrary fixed length, crossing gaps of any size between invariant KAM (lower dimensional) tori. Other results, such as shadowing properties, symbolic dynamics and nonintegrability, etc. , can also be obtained by our method.
In Arnold's original example, the perturbation is carefully chosen so that it does not touch any invariant tori. As an application of our results, we may choose the perturbation of any form in Arnold's example and we conclude that the same results (in fact stronger) hold, as long as the Melnikov integrals have the similar forms.