

Return maps, dynamical consequences and applications

Carles Simó

Dept. de Matemàtica Aplicada i Anàlisi, Universitat de Barcelona, Gran Via 585, 08007,
Barcelona, Catalunya
`carles@maia.ub.es`

Abstract

We consider return maps related to 2D symplectic maps in a semiglobal way. They allow to describe the behaviour of initial points in a set of positive measure. A typical example is the classical separatrix map which, in the simplest case, when the related splitting of separatrices is described by a sinusoidal function, can be approximated by a standard map for suitable values of the parameters.

We present variants of the separatrix map in two cases:

- a) When the related separatrices come from a degenerate saddle. An application is made to bound the measure of the set of escaping points in the Sitnikov problem as a function of the eccentricity of the primaries.
- b) When the splitting function contains additional harmonics of relevant size. An application is made to predict the amount of chaos in a variant of the Hénon-Heiles Hamiltonian for small values of the energy.

In both cases the theoretical predictions are seen to be in very good agreement with numerical simulations.

This is a joint work with Regina Martínez.