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Numerical continuation of families of heteroclinic connections between periodic orbits in a Hamiltonian system

E Barrabés[1], **J M Mondelo**[2] **and M Ollé**[3]

[1] Dept. Informàtica, Matemàtica Aplicada i Estadística, Universitat de Girona, Avda. Lluís Santaló s/n, 17071 Girona, Spain
[2] IEEC and Dept. Matemàtiques, Universitat Autònoma de Barcelona, Edifici C, 08193 Bellaterra, Spain
[3] Dept. de Matemàtica Aplicada I, Universitat Politècnica de Catalunya, Diagonal 647, 08028 Barcelona, Spain

E-mail: barrabes@imae.udg.edu, jmm@mat.uab.es and merce.olle@upc.edu

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Abstract
This paper is devoted to the numerical computation and continuation of families of heteroclinic connections between hyperbolic periodic orbits (POs) of a Hamiltonian system. We describe a method that requires the numerical continuation of a nonlinear system that involves the initial conditions of the two POs, the linear approximations of the corresponding manifolds and a point in a given Poincaré section where the unstable and stable manifolds match. The method is applied to compute families of heteroclinic orbits between planar Lyapunov POs around the collinear equilibrium points of the restricted three-body problem in different scenarios. In one of them, for the Sun–Jupiter mass parameter, we provide energy ranges for which the transition between different resonances is possible.

Mathematics Subject Classification: 70F07, 70F15, 70H12, 70H33, 70K44

(Some figures may appear in colour only in the online journal)

1. Introduction

Homoclinic and heteroclinic connections of hyperbolic invariant sets play an important role in the study of dynamical systems from a global point of view. The field of astrodynamics provides a nice example for their application. In the dynamical models used for preliminary

