

The dynamics around the collinear point L_3 of the RTBP.

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Resumen

We consider the Restricted Three Body Problem (RTBP), both the planar and spatial case, and we restrict our attention to the equilibrium point L_3 . Our aim is centered in the description, as global as possible, of the dynamics around this equilibrium point. It is well known that L_3 is of type center \times center \times saddle, and the initial study of the local dynamics around L_3 gives two families of non-linear Lyapunov periodic orbits (associated with the two centers) and a 2-parametric (cantorian) family of 2-dimensional tori (see for example [3] and [2]).

In this work, we compute the objects in the center manifold of L_3 , including the invariant manifolds associated to them. They are computed by purely numerical procedures, in order to avoid the convergence restrictions of the semi-analytical ones (typically used around L_1 or L_2). We also deal with homoclinic and heteroclinic connections between periodic orbits or invariant tori. In particular, we develop some numerical tools in order to compute homoclinic and heteroclinic orbits.

In [1], the behaviour of the invariant manifolds of L_3 as μ (the mass parameter of RTBP) increases was studied, as well as the homoclinic connections to L_3 . In the present work we initially consider small values of μ , as for them the homoclinic connections of L_3 are horseshoe-shaped. After that, other values of μ will be considered.

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Referencias

- [1] E. Barrabés and M. Ollé. *Invariant manifolds of L_3 and horseshoe motion in the restricted three-body problem*. Nonlinearity, 19:2065–2089, 2006.
- [2] G. Gómez and J. M. Mondelo. *The dynamics around the collinear equilibrium points of the RTBP*. Phys. D, 157(4):283–321, 2001.
- [3] Àngel Jorba and Josep Masdemont. *Dynamics in the center manifold of the collinear points of the restricted three body problem*. Phys. D, 132(1-2):189–213, 1999.