

Ejection-collision orbits in the RTBP

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Abstract

In this paper we analyse the ejection-collision (EC) orbits of the planar restricted three body problem. Being $\mu \in (0, 0.5]$ the mass parameter, and taking the big (small) primary with mass $1 - \mu$ (μ), an EC orbit will be an orbit that ejects from the big primary, does an excursion and collides with it. As it is well known, for any value of the mass parameter $\mu \in (0, 0.5]$ and sufficiently restricted Hill regions (that is, for big enough values of the Jacobi constant C), there are exactly four EC orbits. We check their existence and extend numerically these four orbits for $\mu \in (0, 0.5]$ and for smaller values of the Jacobi constant. We introduce the concept of n -ejection-collision orbits (n -EC orbits) and we explore them numerically for $\mu \in (0, 0.5]$ and values of the Jacobi constant such that the Hill bounded possible region of motion contains the big primary and does not contain the small one. We study the cases $1 \leq n \leq 10$ and we analyse the continuation of families of such n -EC orbits, varying the energy, as well as the bifurcations that appear.

Keywords: regularization, ejection-collision orbits, invariant manifolds, bifurcations.

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