

Transversal Ejection–Collision Orbits for the Restricted Problem and the Hill’s Problem with Applications*

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It is shown that the restricted problem and the Hill’s problem have transversal ejection–collision orbits. These orbits are used to prove that both problems have no C^1 -extendable regular integrals. © 1988 Academic Press, Inc.

INTRODUCTION

We consider the circular planar restricted three-body problem (usually, the restricted problem) in a rotating coordinate system $\mathbf{q} = (q_1, q_2)$ of rotational frequency equal to 1. In this frame we locate the larger primary m_1 of mass $1 - \mu$ at the origin, and the smaller primary m_2 of mass μ at the position $\mathbf{e}_2 = (-1, 0)$, where $\mu \in [0, \frac{1}{2}]$. The Hamiltonian which governs the motion of the zero mass particle m_3 is given by

$$H = |\mathbf{p}|^2/2 + q_2 p_1 - q_1 p_2 - |\mathbf{q}|^{-1} + \mu(|\mathbf{q}|^{-1} - |\mathbf{q} - \mathbf{e}_2|^{-1} - p_2), \quad (0.1)$$

where $\mathbf{p} = (p_1, p_2)$ are the momentum variables conjugate to the \mathbf{q} , and $|\cdot|$ denotes the Euclidean norm in \mathbb{R}^2 .

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