ORIGINAL ARTICLE

The restricted planar isosceles three-body problem with non-negative energy

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Abstract We consider a restricted three-body problem consisting of two positive equal masses $m_1 = m_2$ moving, under the mutual gravitational attraction, in a collision orbit and a third infinitesimal mass m_3 moving in the plane *P* perpendicular to the line joining m_1 and m_2 . The plane *P* is assumed to pass through the center of mass of m_1 and m_2 . Since the motion of m_1 and m_2 is not affected by m_3 , from the symmetry of the configuration it is clear that m_3 remains in the plane *P* and the three masses are at the vertices of an isosceles triangle for all time. The restricted planar isosceles three-body problem describes the motion of m_3 when its angular momentum is different from zero and the motion of m_1 and m_2 is not periodic. Our main result is the characterization of the global flow of this problem.

Keywords 3-Body problem \cdot Restricted isosceles problem \cdot Global flow \cdot Sitnikov-type restricted problem

1 Introduction

For a long time the study of the qualitative properties of the solutions of the *n*-body problem has meant the study of the final configurations and velocities of the bodies.

In a restricted three-body problem we describe the motion of an infinitesimal mass m_3 under the gravitational attraction of the two positive masses m_1 and m_2 called *primaries*. Since

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