ORIGINAL ARTICLE

Periodic orbits of the planar collision restricted 3-body problem

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Abstract Using the continuation method we prove that the circular and the elliptic symmetric periodic orbits of the planar rotating Kepler problem can be continued into periodic orbits of the planar collision restricted 3-body problem. Additionally, we also continue to this restricted problem the so called "comet orbits".

Keywords Collision restricted 3-body problem · Continuation method · Periodic orbits

1. Introduction

We consider a special case of the restricted 3-body problem, called *collision restricted* 3-*body problem*. In our problem the two primaries with equal masses are moving in a collision orbit of the 2-body problem, and the infinitesimal mass is moving on a plane orthogonal to the line of motion of the primaries. The purpose of this paper is to find symmetric periodic orbits of this problem using the continuation method developed by Poincaré which is one of the most frequently used methods for proving the existence of periodic orbits. Starting with Poincaré (1892–1899), which used this method to prove the existence of periodic orbits for circular planar restricted 3-body problem (Szebehely 1967), this method was used also by other authors in different problems like elliptic planar restricted 3-body problem (Arenstorf 1963; Barrar 1965; Sternberg 1969), spatial isosceles 3-body problem (Corbera and Llibre 2001, 2004),

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