

2-DIMENSIONAL INVARIANT TORI FOR THE SPATIAL ISOSCELES 3-BODY PROBLEM

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We consider the circular Sitnikov problem as a special case of the restricted spatial isosceles 3-body problem. In appropriate coordinates we show the existence of 2-dimensional invariant tori that are formed by union of either periodic or quasiperiodic orbits of the circular Sitnikov problem, these tori are not KAM tori. We prove that such invariant tori persist when we consider the spatial isosceles 3-body problem for sufficiently small values of one of the masses. The main tool for proving these results is the analytic continuation method of periodic orbits.

1 Introduction

The main objective of this work is to prove the existence of 2-dimensional invariant tori filled of periodic or quasiperiodic orbits for the spatial isosceles 3-body problem. We note that in particular these tori are 2-dimensional invariant tori for the general spatial 3-body problem. We start reducing, with the help of appropriate coordinates, the dimension of the phase space of the isosceles problem, obtaining in this way the reduced isosceles problem. We see (in Theorem 2) that our tori filled of periodic or quasiperiodic orbits come from periodic orbits of the reduced isosceles problem. Using the analytic continuation method, we prove (in Theorem 6) the existence of symmetric periodic orbits of the reduced isosceles problem, for sufficiently small values of one of the masses, near the known periodic orbits of the reduced circular Sitnikov problem (a particular reduced restricted isosceles problem). Finally we analyze the 2-dimensional invariant tori of the isosceles problem that come from those periodic orbits.

In this paper we present results without proofs. The proofs can be found in Corbera and Llibre², and they constitute the main results of the Ph. D. of the first author.