

Restricted 3-Body Problem on the Space of Constant Curvature

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The n -body problem in celestial mechanics is the problem of determining the position and momentum of the system of n masses attracted to each other by Newton's law of gravitation. For centuries many scientists studied and tried to solve n -body problem, which led to the invention of chaos theory. Unlike the classical 2-body problem, i.e., Kepler's problem, there is no closed solution for n -body problem. Since dealing with n bodies is hard and chaotic, it is reasonable to focus on restricted 3 bodies in which there are two massive bodies and a third one with a negligible mass.

In this talk, we will show that the energy hypersurfaces of the restricted 3-body problem on a space of constant curvature is of contact type when the energy is low. However, these hypersurfaces are not closed due to 2-body collisions. We will also show that the collisions can be regularized to form a closed manifold while preserving the dynamics.

Keywords. Celestial mechanics, the restricted three body problem, surfaces of constant curvature, Hamiltonian formulation, periodic solutions

This is a joint work with Alessandro Arsie.

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