Seminar/Talk

Oscillatory motions and symbolic dynamics in the three body problem

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Host: Kaloshin Group

Consider the three body problem with positive masses m_0, m_1 and m_2. In 1922 Chazy classified the possible final motions the three bodies may possess, that is the behaviors the bodies may have when time tends to infinity. One of them are what is known as oscillatory motions, that is, solutions of the three body problem such that the liminf (as time tends to infinity) of the relative positions between bodies is finite whereas the limsup is infinite. That is, solutions for which the bodies keep oscillating between an increasingly large separation and getting closer together. The first result of existence of oscillatory motions was provided by Sitnikov for a a Restricted Three Body Problem, called nowadays Sitnkikov model. His result has been extended to several Celestial Mechanics models but always with rather strong assumptions on the values of the masses.In this talk I will explain how to construct oscillatory motions for the three body problem for any values m_0, m_1 and m_2 (except for the case of three equal masses). The proof relies on the construction of hyperbolic invariant sets whose dynamics is conjugated to that of the shift of infinite symbols (i.e. symbolic dynamics). That is, we construct invariant sets for the three body problem with chaotic dynamics, which moreover contain oscillatory motions. This is a joint work with Pau Martin, Jaime Paradela and Tere M. Seara.

Monday, April 11, 2022 03:15pm - 04:15pm

Mondi Seminar Room 2, Central Building

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