ATELIER
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22–26 JUILLET, 2013

WORKSHOP
"PLANETARY MOTIONS, SATELLITE DYNAMICS, AND SPACESHIP ORBITS"
JULY 22–26, 2013

On the co-orbital motion of two planets in quasi-circular orbits

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To begin with, I will present an analytical Hamiltonian formalism adapted to the study of the motion of two planets in co-orbital resonance. The Hamiltonian, averaged over one of the planetary mean longitude, is expanded in power series of eccentricities and inclinations. The model, which is valid in the entire co-orbital region, possesses an integrable approximation modelling the planar and quasi-circular motions. Then, focusing on the fixed points of this approximation, I will highlight relations linking the eigenvectors of the associated linearized differential system and the existence of certain remarkable orbits like the elliptic Eulerian and Lagrangian configurations, the anti-Lagrange (MNRAS 407, 390-398 2010) orbits and some second sort orbits discovered by Poincaré. The use of Birkhoff normal forms allows to generalize these results by proving in particular that the elliptic Lagrangian equilateral configurations and the anti-Lagrange orbits bifurcate from the same fixed point $L4$. In the last part of the talk, I shall show how we could apply KAM theory to demonstrate the existence of "horseshoe" quasiperiodic orbits.

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