Bastien Le Bihan
Institut Supérieur de l'Aéronautique et de l'Espace

Semi-analytical Study of the Dynamics about and between the Libration Points of the Sun-Earth-Moon system

In this talk, we are interested in consistently computing the natural connections between the libration point L2 of the Earth-Moon system (EML2) and the libration point L1 and L2 of the Sun-(Earth+Moon) system (SEML1,2) in a single periodic and coherent model of the Sun-Earth-Moon system. First, the invariant manifolds are obtained semi-analytically at each point, using the parameterization method, specifically tailored to account for the periodicity of the problem. A systematic search for connection can then be performed in the parameterization space: initial conditions on the center-unstable manifold at EML2 are propagated forward in time and projected on the semi-analytical center manifold at SEML1,2 . A transfer is found each time that the distance of projection is close to zero. These solutions are refined using a differential correction scheme in the parameterization space, which can be coupled with a continuation procedure to easily obtain families of natural continuous transfers. Finally, the resulting trajectories are refined to JPL ephemerides.