Arnold diffusion in the Restricted Planar Elliptic Three Body Problem

March 2, 2022

Consider the RPE3BP with any mass ratio $\mu \in (0, 1/2)$ and any eccentricity $\epsilon \in (0, 1)$. We build orbits along which the angular momentum of the massless body becomes unbounded as $t \to \infty$. The construction relies on an Arnold diffusion mechanism by designing a transition chain of periodic orbits. For that, we identify an invariant manifold at inifinity and prove that its four dimensional stable and unstable manifolds intersect transversally along two different homoclinic manifolds. These homoclinic manifolds define two *scattering maps* which encode the dynamics along the heteroclinic orbits. We prove that they can be combined to build a sequence of periodic orbits connected by heteroclinics along which the angular momentum grows unboundedly. One of the main difficulties is that the splitting angle between the stable and unstable manifolds is exponentially small with respect to the angular momentum and therefore Melnikov theory cannot be applied. This is joint work with Marcel Guardia and Tere Seara.