

NONLOCAL INSTABILITY OF THE PLANAR 3 BODY PROBLEM

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The Restricted Planar Circular 3 Body Problem (RPC3BP) which is the simplest nonintegrable 3 body problem. Usually it is viewed as a model for planar either Sun-Jupiter-Asteriod or Sun-Earth-Moon system. Stability v.s. instability of such a system is one of long standing problems. Using Aubry-Mather theory, Mather variational method, and numerical analysis, we managed to prove existence of a rich variety of unstable motions. For example, an Asteroid could have a nearly elliptic orbit of say eccentricity 0.75 in the past and escape to infinity along nearly parabolic orbit of eccentricity more than 1 in the future. These motions could be interpreted as Arnold diffusion for this system. Instability results for RPC3BP imply instability for more general planar 3 body problems. This is a joint work with T. Nguyen and D. Pavlov.