# Oscillatory motions and parabolic manifolds at infinity in the planar circular restricted three body problem

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**Abstract**
Consider the Restricted Planar Circular 3 Body Problem. If the trajectory of the body of zero mass is defined for all time, it can have the following four types of asymptotic motion when time tends to infinity forward or backward in time: bounded, parabolic (goes to infinity with asymptotic zero velocity), hyperbolic (goes to infinity with asymptotic positive velocity) or oscillatory (the position of the body is unbounded but goes back to a compact region of phase space for a sequence of arbitrarily large times). We will show a geometric mechanism that proves the existence of all possible combinations of past and future final motions, and apply it to the Jupiter-Sun system.