Computer Assisted Proof for Fibers of Invariant Manifolds in the Planar Restricted Circular Three Body Problem

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We first present a computer assisted proof for detection of the family of Lyapounov orbits around the equilibrium point L1 in the Planar Restricted Circular Three Body Problem. The method provides very tight estimates and can be applied over a broad range of energies of the orbits. We then present a method for detection of fibers of stable/unstable manifolds associated with the family of orbits. The method is based on a combination of a parameterization method together with cone conditions and topological arguments. We also discuss propagation of the fibers along the flow to prove transversal intersections of the manifolds.