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Rigorous Computation of Central Configurations via Interval Methods

Abstract

We will discuss our approach to the question of finding all central configurations. Our program performs an extensive top-down search for central configurations. At each step we bisect the box until a central configuration is found or proven not to exist. The algorithm succeeds until it stumbles upon bifurcations or masses close to zero. These cases have to be treated differently. At present we can deal with codimension one bifurcations and relatively thin intervals in the mass space.

With our program we obtained computer assisted proofs for some particular choices of masses for $n = 4, 5, 6, 7$ in planar case and $n = 5, 6$ in spatial case.

Joint work with Piotr Zgliczyński.