Central configurations - some rigorous computer assisted results

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I will give an overview of our of recent computer assisted proofs for the rigorous count of central configurations.

Our approach is based on: - the use of interval arithmetics methods, for example the Newton-Krawczyk operator - a priori bounds for central configurations

This allows to obtain an rigorous listing of all central configurations when masses are away from zero and there are no bifurcation nearby in the mass space, we have done for equal masses in the planar case for $n = 5, 6, 7$ and in the spatial case for $n = 5, 6$.

To extend this approach to all masses the following issues has to be solved: - understanding of restricted N+k problems (N-big masses and k "massless" bodies) and their continuation to full problem - rigorous treatment of bifurcations

References:

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2) M. Moczurad, P. Zgliczyński, Central configurations in spatial n-body problem for $n = 5, 6$ with equal masses , Celestial Mechanics and Dynamical Astronomy, (2020) 132:56

3) M. Moczurad, P. Zgliczyński, Central configurations on the plane with N heavy and k light bodies, Communications in Nonlinear Science and Numerical Simulation, 114 (2022), 106533

Joint work with Moczurad Malgorzata (Jagiellonian University, Poland).