Numerical continuation of one-parameter families of periodic orbits

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SUMMARY

We present here techniques to carry out the numerical continuation of one-parameter families of periodic orbits. The main algorithm used is due to Deprit & Henrard (1967). These continuation methods follow periodic orbits along paths in the parameter plane showing the evolution of the family and its bifurcations.

This method consist of a general algorithm of computing periodic orbits, but they take ad- vantage of the simplifications due to the nature of the problems treated, namely autonomous Hamiltonian systems. We will show how to combine it with other algorithms with the purpose of computing uni-parametric families of periodic orbits. The Deprit and Henrard continuation algorithm addresses a boundary value problem for the variational equations relative to a conservative dynamical system. It consists on separating the normal displacements along an orbit from the tangential ones. This algorithm is not restricted to symmetric problems, and is valid for the computation of families of periodic orbits for variations of any parameter or integral for a conservative dynamical system with two or three degrees of freedom.

Keywords: Periodic orbits, Hamiltonian systems, bifurcations

AMS Classification: 7J45, 37M20

References

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