

A. Pfeiffer, M. Arnold

Numerical analysis of structure preserving Nyström methods for Hamiltonian systems. - Applied Numerical Mathematics. - 53:391–408. - 2005.

Abstract. Energy conservation is an essential property of conservative mechanical systems that should be carried over to the numerical solution. Betsch and Steinmann proposed recently perturbed potentials to achieve energy conservation in the time integration of N-body problems by Galerkin methods. In the present paper this approach is generalised to Nyström methods for Hamiltonian systems. A detailed analysis shows that energy conservation by perturbed potential functions does not affect the feasibility and (high) order of convergence of Nyström methods. Symmetry and reversibility properties are left unchanged as well. The theoretical results are illustrated by numerical tests indicating clearly the benefits of energy conserving methods in long-term simulations.

Contact: andreas.pfeiffer@dlr.de, martin.arnold@mathematik.uni-halle.de