



THE UNIVERSITY OF CHICAGO

Departments of Computer Science, Mathematics, and Statistics
SCIENTIFIC AND STATISTICAL COMPUTING SEMINAR

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Topics in Numerical Integration of Hamiltonian Systems

THURSDAY, October 18, 2012, at 3:00 PM
206 Eckhart Hall, 5734 S. University Avenue

ABSTRACT

We will review two recent contributions related to the efficient numerical integration of Hamiltonian systems. The application fields are e.g. molecular dynamics and celestial mechanics. The first contribution addresses the issue of integration of some highly oscillatory Hamiltonian systems. An approach based on homogenization and the Hamilton-Jacobi form of the equations of motion, giving rise to symplectic integrators, is developed and tested. It is joint work with F. Legoll (Paris) and M. Dobson (now UMass). The second contribution is related to parallel in time integration of Hamiltonian systems. The parareal method, an approach introduced a decade ago, is adapted to the specific case of Hamiltonian systems. Symmetric, invariant-preserving integrators are developed. Numerical tests on benchmark systems confirm the interest of the approach. It is joint work with Y. Maday (Paris 6 and Brown), X. Dai (Beijing), and F. Legoll (Paris).

References: <http://arxiv.org/abs/1008.1030>, <http://arxiv.org/abs/1011.6222>

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