Symplectic Interval Methods
for Solving Hamiltonian Problems

Karol GAJDA

Poznań University of Technology, Institute of Mathematics
ul. Piotrowo 3a, 60-965 Poznań, Poland
e-mail: Karol.Gajda@put.poznan.pl

Andrzej MARCINIAK

Poznań University of Technology, Institute of Computing Science
ul. Piotrowo 2, 60-965 Poznań, Poland
and
Adam Mickiewicz University, Faculty of Mathematics and Computer Science
ul. Umultowska 87, 61-614 Poznań, Poland
e-mail: Andrzej.Marciniak@put.poznan.pl

Abstract. Symplectic interval methods of Runge-Kutta type for solving Hamiltonian problems are proposed. By implementing such methods in floating-point interval arithmetic one can obtain solutions in the form of intervals containing all possible numerical errors. Some numerical experiments for the Hill equations are presented.

Key words: symplectic intervals methods, interval arithmetic, solving the initial value problem, Hamiltonian problems, the Hill equations