

STRUCTURE-PRESERVING MGARK METHODS FOR HAMILTONIAN SYSTEMS

Kevin Schäfers

University of Wuppertal, Germany

kschaefers@uni-wuppertal.de

Generalized additive Runge-Kutta (GARK) schemes have shown to be a suitable tool for solving ordinary differential equations with additively partitioned right-hand sides. This work combines the ideas of symplectic GARK schemes and multirate GARK (MGARK) schemes to solve additively partitioned Hamiltonian systems with multirate behavior more efficiently. In a general setting of non-separable Hamiltonian systems, order conditions, as well as conditions for symplecticity, symmetry and time-reversibility are derived. Moreover, investigations for the special case of separable Hamiltonian systems are carried out. Numerical results underline the performance of the derived schemes.

Joint work with Michael Günther (University of Wuppertal, Germany) and Adrian Sandu (Virginia Polytechnic Institute and State University, USA).