A Survey of Interval Methods for Solving the Initial Value Problem

Karol Gajda[1], Małgorzata Jankowska[2], Andrzej Marciniak[3,4], Barbara Szyszka[1]
[1]Institute of Mathematics
Poznań University of Technology, Piotrowo 3a, 60-965 Poznań, Poland
Karol.Gajda@put.poznan.pl, Barbara.Szyszka@put.poznan.pl
[2]Institute of Applied Mechanics
Poznań University of Technology, Piotrowo 3, 60-965 Poznań, Poland
Malgorzata.Jankowska@put.poznan.pl
[3]Institute of Computing Science
Poznań University of Technology, Piotrowo 2, 60-965 Poznań, Poland
[4]Faculty of Mathematics and Computer Science
Adam Mickiewicz University, Umultowska 87, 61-614 Poznań, Poland
Andrzej.Marciniak@put.poznan.pl

The paper is dealt with a number of one- and multistep interval methods developed by our team during the last decade. We present implicit interval methods of Runge-Kutta type, interval versions of symplectic Runge-Kutta methods and interval multistep methods of Adams-Bashforth, Adams-Moulton, Nyström and Milne-Simspon types. On the basis of many numerical experiments provided in floating-point interval arithmetic we compare these methods and present some conclusions.