

# New Runge-Kutta based schemes for ODEs with cheap global error estimation

Joseba Makazaga

`joxe@si.ehu.es`

UPV/EHU University of the Basque Country, Spain

## **Abstract**

We present a particular 5th order scheme of one-step integrator for ODEs that provides an estimation of the global error. It's based on the class of one-step integrator for ODEs of Murua and Makazaga (2000) considered as a generalization of the globally embedded Runge-Kutta methods of Dormand, Gilmore and Prince (1994). The scheme we present cheaply gives useful information on the behavior of the global error. Some numerical experiments show that the estimation of the global error reflects the propagation of the true global error. The experiments have been made using a new general purpose software which is under development. Moreover we present a new step-size adjustment strategy that takes advantage of the information about the global error. The new strategy is specially suitable for problems with exponential global error's growth.