Seminarium Zespołu Matematyki Obliczeniowej

W dniu 10 grudnia 2019 r. (wtorek) o godz. 12:00
w sali 303 (w łączniku A3-A4)

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wygłosi referat pt.

Error estimation for implicit-explicit general linear methods

Serdecznie zapraszamy!

Abstract: Many practical problems in science and engineering are modeled by large systems of ordinary differential equations (ODEs) which arise from space discretization of partial differential equations (PDEs). For such differential systems there are often additive splittings of the right hand sides into two parts, so they can be written in the form

$$\begin{cases} y'(t) = f\big(y(t)\big) + g\big(y(t)\big), & t \in [t_0, T], \\ y(t_0) = y_0, \end{cases}$$

$y_0 \in \mathbb{R}^m$, $f : \mathbb{R}^m \to \mathbb{R}^m$, $g : \mathbb{R}^m \to \mathbb{R}^m$, where $f(y)$ represents the non-stiff processes and $g(y)$ represents stiff processes. For efficient integration of such kind of systems we consider implicit-explicit (IMEX) methods, where the non-stiff part $f(y)$ is integrated by an explicit numerical scheme, and the stiff part $g(y)$ is integrated by an implicit numerical scheme.
After the investigation of IMEX Runge-Kutta (RK) methods [1], and IMEX General Linear Methods (GLMs) [2,3] in a fixed stepsize formulation, we focus on estimation of local discretization errors and rescaling stepsize techniques for high stage order IMEX GLMs in fixed and variable stepsize environments. We also describe the construction of such methods with desirable accuracy and stability properties.
This is a joint work with Zdzisław Jackiewicz, Arizone State University, USA and Angelamaria Cardone, University of Salerno, Italy.

References

[1] G. Izzo and Z. Jackiewicz, Highly stable implicit-explicit Runge-Kutta methods, *Appl. Numer. Math.*, 113(2017) 71–92.
[2] M. Bras, G. Izzo and Z. Jackiewicz, Accurate Implicit–Explicit General Linear Methods with Inherent Runge–Kutta Stability, *J. Sci. Comput.*, Vol. 70(3), 2017, 1105–1143.
[3] G. Izzo and Z. Jackiewicz, Transformed implicit-explicit DIMSIMs with strong stability preserving explicit part, *Numer. Algorithms*, Vol. 81(4), 2019, 1343–1359.