Efficient integration of matrix-valued non-stiff DAEs by half-explicit methods

Linh Vu (Vietnam National University Hanoi), Vu Hoang Linh and Volker Mehrmann

This talk is concerned with numerical solutions of nonlinear differential-algebraic equations (DAEs) in strangeness-free form. In particular, we focus on efficient methods for solving a special class of semi-linear matrix-valued DAEs which arise in the numerical computation of spectral intervals for DAEs. Half-explicit methods based on popular explicit methods like one-leg methods, linear multi-step methods, and Runge-Kutta methods are proposed and analysed. Compared with well-known implicit methods for DAEs, these half-explicit methods demonstrate their efficiency, particularly for the above mentioned semi-linear matrix-valued DAEs. The theoretical convergence results are confirmed by numerical experiments.