Efficient Computation of Lyapunov and Sacker-Sell Spectra for DAEs with Half-explicit Methods

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Abstract: Numerical integration methods for nonlinear differential-algebraic equations (DAEs) in strangeness-free form are studied. In particular, half-explicit methods based on popular explicit methods like one-leg methods, linear multi-step methods, and Runge-Kutta methods are proposed and analyzed. Compared with well-known implicit methods for DAEs, these half-explicit methods demonstrate their efficiency particularly for a special class of semi-linear matrix DAEs which arise in the numerical computation of spectral intervals for DAEs. Numerical experiments illustrate the theoretical results.

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