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Numerical solution of a class of delay differential-algebraic equations by half-explicit methods

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Delay differential-algebraic equations (DAEs) can be used for modeling real-life phenomena that involve simultaneously time-delay effect and constraints. It is also known that solving delay DAEs is more complicated than solving non-delay ones because interpolation errors for the solution in the past time may arise in addition to discretisation errors. Recently, we have investigated the efficient use of half-explicit methods for strangeness-free DAEs (without delay). In this talk, we propose and analyse some efficient half-explicit methods for a class of structured strangeness-free DAEs with constant delay. Convergence results for half-explicit linear multistep (HELM) methods and half-explicit Runge-Kutta (HERK) methods are obtained. Numerical experiments are also given for illustration.

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