Adaptive β-blocked multistep methods for index 2 Euler-Lagrange differential algebraic equations

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It is common to use BDF methods to solve index 2 DAE systems numerically even for non-stiff state space form of a problem. Because the solution with non-stiff integrators such as Adams-Moulton discretizations, is unstable. A technique designed to overcome this instability is β-blocking [1, 4, 2]. This stabilizing technique was developed for fixed step-size multistep methods.
In this talk we present a polynomial formulation of $\beta-$blocked multistep methods [3] that allows the use of variable step-sizes by construction. We formulate adaptive singular and regular $\beta-$blocked multistep methods and demonstrate their performance by some numerical examples.

References

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