Stability Criteria for Differential-Algebraic Equations with Multiple Delays and Their Numerical Solutions

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Abstract: This research is concerned with the asymptotic stability of differential-algebraic equations with multiple delays and their numerical solutions. First, we give a sufficient condition for delay-independent asymptotic stability. After characterizing the coefficient matrices that satisfy this stability condition, we propose some practical checkable criteria for asymptotic stability. Then, we investigate the stability of numerical solutions obtained by linear multistep methods such as θ-methods and BDF methods. Finally, solvability and stability of a class of weakly regular delay differential-algebraic equations are analyzed.

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