A Family of Block Numerical Multistage-Multistep Method with Advanced Step-Points

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Abstract

A special class of multistage and multistep integration methods which can
obtain r new values simultaneously at each integration step were developed. The
block extended backward differentiation formulas also contain extended step-point in
the formulas. Their stability regions were sketched, and their regions are either
A-stable or A(a) -stable. In addition, in a predictor-corrector scheme, their stability
interval is one of the largest among some known articles. Applications of the block
formulas to numerical solutions of stiff differential equations by Newton's scheme
were also studied.

Keyword：Multistage and multistep methods, Extended backward
differentiation formulas, A-stable, A(a) -stable, Predictor-corrector
scheme, Stiff equations