

A-stable diagonally implicit Runge-Kutta-Nystr m methods for parallel computers

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Abstract: In this paper, we study diagonally implicit Runge-Kutta-Nystr m methods (DIRKN methods) for use on parallel computers. These methods are obtained by diagonally implicit iteration of fully implicit Runge-Kutta-Nystr m methods (corrector methods). The number of iterations is chosen such that the method has the same order of accuracy as the corrector, and the iteration parameters serve to make the method at least A-stable. Since a large number of the stages can be computed in parallel, the methods are very efficient on parallel computers. We derive a number of A-stable, strongly A-stable and L-stable DIRKN methods of order p with $s^*(p)$ sequential, singly diagonal-implicit stages where $s^*(p) = [(p+1)/2]$ or $s^*(p) = [(p+1)/2] + 1$, $[?]$ denoting the integer part function.   1993 J.C. Baltzer AG Science Publishers.

Author Keywords: Diagonally implicit Runge-Kutta-Nystr m methods; parallelism; predictor-corrector methods; **Subject classification:** 65M12, 65M20

Year: 1993

Source title: Numerical Algorithms

Volume: 4

Issue: 2

Page : 263-281

Cited by: 5

Link: [Scopus Link](#)

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Publisher: Baltzer Science Publishers, Baarn/Kluwer Academic Publishers

ISSN: 10171398

DOI: 10.1007/BF02144107

Language of Original Document: English

Abbreviated Source Title: Numerical Algorithms

Document Type: Article

Source: Scopus

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