A general class of explicit pseudo two-step RKN methods on parallel computers

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Abstract: The aim of this paper is to investigate a general class of explicit pseudo two-step Runge-Kutta-Nystr??m methods (RKN methods) of arbitrarily high order for nonstiff problems for systems of special second-order differential equations y??(t) = f(y(t)). Order and stability considerations show that we can obtain for any given p, a stable p^{th}-order explicit pseudo two-step RKN method requiring p - 2 right-hand side evaluations per step of which each evaluation can be obtained in parallel. Consequently, on a multiprocessor computer, only one sequential right-hand side evaluation per step is required. By a few widely-used test problems, we show the superiority of the methods considered in this paper over both sequential and parallel methods available in the literature.
Author Keywords: Parallelism; Runge-Kutta-Nystr??m methods; Stability; Two-Step Runge-Kutta-Nystr??m methods

Year: 1999
Source title: Computers and Mathematics with Applications
Volume: 38
Issue: 6-May
Page : 17-30
Link: Scorpus Link
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ISSN: 8981221
CODEN: CMAPD
Language of Original Document: English
Abbreviated Source Title: Computers and Mathematics with Applications
Document Type: Article
Source: Scopus
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