Explicit pseudo two-step RKN methods with stepsize control

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Abstract: This paper is devoted to variable stepsize strategy implementations of a class of explicit pseudo two-step Runge-Kutta-Nystr??m methods of arbitrarily high order for solving nonstiff problems for systems of special second-order differential equations. The constant stepsize explicit pseudo two-step Runge-Kutta-Nystr??m methods are developed into variable stepsize ones and equipped with embedded formulas giving a cheap error estimate for stepsize control. By two examples of widely-used test problems, a pseudo two-step Runge-Kutta-Nystr??m method of order 8 implemented with variable stepsize strategy is shown to be much more efficient than parallel and sequential codes available in the literature. With stringent error tolerances, this new explicit pseudo two-step Runge-Kutta-Nystr??m method is even superior to sequential codes in a sequential computer. ?? 2001 IMACS.

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Index Keywords: Differential equations; Error analysis; Problem solving; Two-step Runge-Kutta-Nystrom (RKN) methods; Runge Kutta methods

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