

Parallel Predictor-Corrector Iteration of Pseudo Two-Step RK Methods for Nonstiff IVPs

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Abstract: A parallel predictor-corrector (PC) iteration scheme for a general class of pseudo two-step Runge-Kutta methods (PTRK methods) of arbitrarily high order is analyzed for solving first-order nonstiff initial-value problems (IVPs) on parallel computers. Starting with an s-stage pseudo two-step RK method of order p^* with w implicit stages, we apply the highly parallel PC iteration process in $P(EC)^mE$ mode. The resulting parallel-iterated pseudo two-step RK method (PIPTRK method) uses an optimal number of processors equal to w . By a number of numerical experiments, we show the superiority of the PIPTRK methods proposed in this paper over both sequential and parallel methods available in the literature.

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