Parallel-iterated RK-type PC methods with continuous output formulas

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Abstract: This paper investigates parallel predictor-corrector iteration schemes (PC iteration schemes) based on collocation Runge-Kutta corrector methods (RK corrector methods) with continuous output formulas for solving nonstiff initial-value problems (IVPs) for systems of first-order differential equations. The resulting parallel-iterated RK-type PC methods are also provided with continuous output formulas. The continuous numerical approximations are used for predicting the stage values in the PC iteration processes. In this way, we obtain parallel PC methods with continuous output formulas and high-accurate predictions. Applications of the resulting parallel PC methods to a few widely-used test problems reveal that these new parallel PC methods are much more efficient when compared with the parallel and sequential explicit RK methods from the literature.

Author Keywords: Parallelism; Predictor-corrector methods; Runge-Kutta methods; Stability

Index Keywords: Asymptotic stability; Differential equations; Initial value problems; Iterative methods; First-order differential equations; Parallelism; Predictor-corrector methods; Runge Kutta methods

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