Continuous parallel-iterated RKN-type PC methods for nonstiff IVPs

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Abstract: This paper investigates parallel predictor-corrector (PC) iteration schemes based on direct collocation Runge-Kutta-Nystr??m (RKN) corrector methods with continuous output formulas for solving nonstiff initial-value problems (IVPs) for systems of special second-order differential equations $y^{??}(t) = f(t, y(t))$. Consequently, the resulting parallel-iterated RKN-type PC methods are provided with continuous output formulas. The continuous numerical approximations are also 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-order predictors. 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-iterated RKN (PIRKN) methods and the sequential ODEX2 and DOPRIN codes from the literature. ?? 2006 IMACS.

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

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