Fast convergence PIRKN-type PC methods with Adams-type predictors

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Abstract: This paper discusses predictor-corrector iteration schemes (PC iteration schemes) based on direct collocation-based Runge-Kutta-Nystr??m corrector methods (RKN corrector methods) for solving nonstiff initial-value problems (IVPs) for systems of special second-order differential equations y??(t)=f(y(t)). Our approach is to regard the well-known parallel-iterated RKN methods (PIRKN methods) as PC iteration processes in which the simple, low-order last step value predictors are replaced with the high-order Adams-type predictors. Moreover, the parameters of the new direct collocation-based RKN corrector methods are chosen in such a way that the convergence rate of the considered PC iteration processes is optimized. In this way, we obtain parallel PC methods with fast convergence and high-accurate predictions. Application of the resulting parallel PC methods to a few widely-used test problems reveals that the sequential costs are very much reduced when compared with the parallel and sequential explicit RKN methods from the literature. ??2001 OPA (Overseas Publishers Association) N.V. Published by license under the Gordon and Breach Science Publishers imprint.

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