# Runge-Kutta-Nystr??m-type parallel block predictor-corrector methods

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Abstract: This paper describes the construction of block predictor-corrector methods based on Runge-Kutta-Nystr??m correctors. Our approach is to apply the predictor-corrector method not only with stepsize h, but, in addition (and simultaneously) with stepsizes $a_i h$, i = 1, . . . , r. In this way, at each step, a whole block of approximations to the exact solution at off-step points is computed. In the next step, these approximations are used to obtain a high-order predictor formula using Lagrange or Hermite interpolation. Since the block approximations at the off-step points can be computed in parallel, the sequential costs of these block predictor-corrector methods are comparable with those of a conventional predictor-corrector method. Furthermore, by using Runge-Kutta-Nystr??m corrector methods, the computation of the approximation at each off-step point is also highly parallel. Numerical comparisons on a shared memory computer show the efficiency of the methods for problems with expensive function evaluations. ?? J.C. Baltzer AG, Science Publishers.

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

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