

عنوان مقاله:

Higher-order multi-step Runge-Kutta-Nyström methods with frequency-dependent coefficients for second-order initial value problem  $u'' = f(x, u, u')$

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خلاصه مقاله:

In this study, for the numerical solution of general second-order ordinary differential equations (ODEs) that exhibit oscillatory or periodic behavior, fifth- and sixth-order explicit multi-step Runge-Kutta-Nyström (MSGRKN) methods, respectively, are constructed. The parameters of the proposed methods rely on the frequency  $\omega$  of each problem whose solution is a linear combination of functions  $\{e(i\omega x), e(-i\omega x)\}$  or  $\{\cos(\omega x), \sin(\omega x)\}$ . The study also includes an analysis of the linear stability of the suggested methods. The numerical results indicate the efficiency of the proposed methods in solving such problems compared to methods with similar characteristics in the literature

کلمات کلیدی:

Explicit methods, trigonometrical fitting, Multi-step Runge-Kutta-Nyström methods, initial value problems, general second-order oscillatory differential equations

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