

Exponentially-fitted and trigonometrically-fitted two derivative Runge-Kutta-Nystrom methods for solving $y''(x) = f(x, y, y')$

ABSTRACT

Two exponentially fitted and trigonometrically fitted explicit two-derivative Runge-Kutta-Nyström (TDRKN) methods are being constructed. Exponentially fitted and trigonometrically fitted TDRKN methods have the favorable feature that they integrate exactly second-order systems whose solutions are linear combinations of functions $\{\exp(wx), \exp(-wx)\}$ and $\{\sin(wx), \cos(wx)\}$ respectively, when $w \in \mathbb{R}$, the frequency of the problem. The results of numerical experiments showed that the new approaches are more efficient than existing methods in the literature.

Keyword: Exponentially fitted; Trigonometrically fitted; Runge-Kutta-Nystrom method