Exponentially fitted and trigonometrically fitted explicit modified Runge-Kutta type methods for solving y''' (x)=f (x,y,y')

ABSTRACT

Exponentially fitted and trigonometrically fitted explicit modified Runge-Kutta type (MRKT) methods for solving y''' (x)=f (x,y,y') are derived in this paper. These methods are constructed which exactly integrate initial value problems whose solutions are linear combinations of the set functions *ewx* and *e-wx* for exponentially fitted *sin(wx)* and *cos (wx)* for trigonometrically fitted with $w \in r$ being the principal frequency of the problem and the frequency will be used to raise the accuracy of the methods. The new four-stage fifth-order exponentially fitted and trigonometrically fitted explicit MRKT methods are called EFMRKT5 and TFMRKT5, respectively, for solving initial value problems whose solutions involve exponential or trigonometric functions. The numerical results indicate that the new exponentially fitted and trigonometrically fitted explicit modified Runge-Kutta type methods are more efficient than existing methods in the literature.

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