Modified block Runge-Kutta methods with various weights for solving stiff ordinary differential equations

ABSTRACT

A modified block Runge-Kutta (MBRK) methods for solving first order stiff ordinary differential equations (ODEs) are developed. Three sets of weight are chosen and implemented to the proposed methods. Stability regions of the MBRK methods are analyzed. Performances of the MBRK methods in terms of accuracy and computational time are compared with the classical third order Runge-Kutta (RK3) method and modified weighted RK3 method based on Centroidal mean (MWRK3CeM). The numerical results show that the proposed methods outperformed the comparing methods. Comparisons between the sets of weight used are also examined.

Keyword: Runge-Kutta method; Block method; Weights; Stiff ODEs; Centroidal mean