

Numerical algorithm of block method for general second order ODEs using variable step size

ABSTRACT

This paper outlines an alternative algorithm for solving general second order ordinary differential equations (ODEs). Normally, the numerical method was designed for solving higher order ODEs by converting it into an n-dimensional first order equations with implementation of constant step length. Nevertheless, this involved a lot of computational complexity which led to consumption a lot of time. Consequently, a direct block multistep method with utilization of variable step size strategy is proposed. This method was developed for computing the solution at four points simultaneously and the derivation based on numerical integration as well as using interpolation approach. The convergence of the proposed method is justified under suitable conditions of stability and consistency. Five numerical examples are considered and some comparisons are made with the existing methods for demonstrating the validity and reliability of the proposed algorithm.

Keyword: Block method; General second order ordinary differential equations; Variable step size