World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:17, No:11, 2023

Implicit Off-Grid Block Method for Solving Fourth and Fifth Order Ordinary Differential Equations Directly

Authors : Olusola Ezekiel Abolarin, Gift E. Noah

Abstract : This research work considered an innovative procedure to numerically approximate higher-order Initial value problems (IVP) of ordinary differential equations (ODE) using the Legendre polynomial as the basis function. The proposed method is a half-step, self-starting Block integrator employed to approximate fourth and fifth order IVPs without reduction to lower order. The method was developed through a collocation and interpolation approach. The basic properties of the method, such as convergence, consistency and stability, were well investigated. Several test problems were considered, and the results compared favorably with both exact solutions and other existing methods.

Keywords : initial value problem, ordinary differential equation, implicit off-grid block method, collocation, interpolation
Conference Title : ICAME 2023 : International Conference on Advances in Mathematics Education
Conference Location : London, United Kingdom
Conference Dates : November 27-28, 2023