Integration for special third-order ordinary differential equations using improved Runge-Kutta direct method

ABSTRACT

In this paper, we derive an explicit four stage fifth-order Improved Runge-Kutta (IRKD) method for numerical integration of special third-order ordinary differential equation. The method proposed here is two-step in nature and require less number of stages per step compared with the existing Runge-Kutta (RK) method. The stability polynomial of the IRKD method is presented. Numerical results are given to illustrate the efficiency of the proposed method compared to the RK method and direct Runge-Kutta (RKD) method for solving special third-order ordinary differential equations.

Keyword: Special third-order ordinary differential equations; Runge-Kutta method; IRKD method; Stability ploynomial