A sixth-order RKFD method with four-stage for directly solving special fourth-order ODEs

ABSTRACT

In this article, the general form of Runge-Kutta method for directly solving a special fourth-order ordinary differential equations denoted as RKFD method is given. The order conditions up to order seven are derived, based on the order conditions, we construct a new explicit four-stage sixth-order RKFD method denoted as RKFD6 method. Zero-stability of the method is proven. Comparisons are made using the existing Runge–Kutta methods after the problems are reduced to a system of first order ordinary differential equations. Numerical results are presented to illustrate the efficiency and competency of the new method.