Abstract

The Runge-Kutta equations of condition are reformulated. The concept of m-symmetry is defined. It is shown that any m-symmetric method is of order m. The equations of condition for a twelfth-order explicit Runge-Kutta method with twenty-five stages are solved using m-symmetry. The method contains an embedded tenth-order method that can be used to estimate the local truncation errors and thus to vary the stepsize. Numerical experiments demonstrate that the method compares favorably with other high-order methods, especially for those problems requiring highly accurate solutions.