Rational finite difference solution of first-order fredholm integro-differential equations via SOR iteration

ABSTRACT

The linear rational finite difference method (LRFD) is becomingmore and more popular recently due to its excellent stability properties and convergence rate, especially when we are approximating the derivative of some points near the end of the interval. The main intention of this paper is to combine the 3-point linear rational finite difference (3LRFD) method with the composite trapezoidal (CT) quadrature formula to discretize the first-order linear integro-differential equation and produce dense linear systems. Furthermore, the numerical solution of the integrodifferential equation is obtained by implementing the Successive Over-Relaxation (SOR) method. At the same time, the classical Gauss–Seidel (GS) method is also introduced as the control condition. In the end, through several numerical examples, the number of iterations, the execution time and the maximum absolute error are compared, which fully illustrated the superiority of SOR method over GS method in solving large dense linear system generated by the CT-3LRFD formula.