

Linear Rational Finite Difference Approximation for Second-Order Linear Fredholm Integro-Differential Equations Using the Half-Sweep SOR Iterative Method

ABSTRACT

This paper proposes the hybridization of the three-point half-sweep linear rational finite difference (3HSLRFD) schemes with the half-sweep composite trapezoidal (HSCT) approach to derive the 3HSLRFDHSCT discretization schemes, in which these discretization schemes are used to derive the corresponding approximation equation for second-order linear Fredholm integrodifferential equation. Based on the approximation equation, the related linear system can be generated, in which its coefficient matrix is dense. Furthermore, the half-sweep Successive Over-Relaxation (HSSOR) technique is implemented to find the numerical solution of the linear system. To make a comparison, the full-sweep Gauss-Seidel (FSGS) and the full-sweep Successive Over-Relaxation (FSSOR) techniques are also presented as the control method. In numerical experiments, three parameters like the quantity of iterations, elapsed time and the maximum absolute errors have been recorded via three methods. Lastly, it can be pointed out that the HSSOR technique is more superior to the other two techniques, especially in terms of the quantity of iterations and elapsed time