

## **SOR iterative method for the linear rational finite difference solution of second-order Fredholm integro-differential equations**

### **ABSTRACT**

In this paper, a new three-point linear rational finite difference (3LRFD) formula is investigated, which is combined with the compound trapezoidal scheme to discretize the differential term and integral term of second-order linear Fredholm integro-differential equation (SOLFIDE) respectively, and then the corresponding 3LRFD-quadrature approximation equation can be derived and generate the large and dense linear system. Additionally, the Successive Over-Relaxation method is implemented to solve the generated linear system and ultimately obtain the numerical solution of the SOLFIDE. To verify the effectiveness and accuracy of the proposed method, several numerical examples are considered and solved through the classical Gauss-Seidel method, which illustrates that the proposed method leads to a fewer number of iterations and faster execution time, and higher accuracy.