

On redlich-kister finite difference solution of two-point boundary value problems using half-sweep kaudd successive over relaxation iteration

### **ABSTRACT**

This paper deals with the application of two newly established Redlich-Kister Finite Difference (RKFD) discretization schemes for approximating and solving two-point boundary value problems (TPBVPs). To get the Redlich-Kister Finite Difference Solution of the proposed problem, firstly, two newly second-order half-sweep RKFD discretization schemes are established and used to discretize overall derivative terms of the TPBVPs regarding getting the second-order half-sweep RKFD approximation equation. Then this RKFD approximation equation leads to the construct of the linear system. Due to the increase in the convergence rate iteratively in solving this linear system, the combination of the Kaudu Successive Over Relaxation (KSOR) method with a half-sweep approach is formulated and then known as Half-sweep Kaudu Successive Over Relaxation (HSKSOR) method. With the purpose of evaluating the efficiency of the HSKSOR method, other methods such as Full-sweep Kaudu Successive Over Relaxation (FSKSOR) and Full-sweep Gauss-Seidel (FSGS) are also presented as a control method. The results of the examples of TPBVPs are tested to prove that the HSKSOR iteration is more efficient compared with FSGS and FSKSOR iterations in terms of iterations, execution time, and maximum norm.