

Numerical evaluation of quarter-sweep KSOR method to solve time-fractional parabolic equations

ABSTRACT

We study the performance of the combination of quarter-sweep iteration concept with the Kaudu Successive Over-Relaxation (KSOR) iterative method in solving the discretized one-dimensional time-fractional parabolic equation. We called the mixed of these two concepts as QSKSOR. The time-fractional derivative in Grünwald sense, together with the implicit finite difference scheme was used to discretized the tested problems to form the quarter-sweep implicit finite difference approximation equations in the sense of Grünwald type. This approximation equation of half-sweep will then generate a linear system. Next, we used the proposed QSKSOR iterative method to the generated linear systems before comparing the effectiveness between the other family of KSOR method, FSKSOR and HSKSOR with respect to the full- and half-sweep cases respectively. To do so, three examples are included. The results of this study show the superiority of the QSKSOR iterative method in terms of iteration numbers and execution time in comparison to the other two methods.