INSTITUTE OF MATHEMATICAL SCIENCES
UNIVERSITI MALAYA

SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Application of SOR iteration family for Caputo's finite difference solution of space-fractional and time-fractional diffusion equations.

Speaker: Prof. Dr. Jumat Sulaiman
(Director of Preparatory Centre for Science & Technology, Universiti Malaysia Sabah)

Date: 20/05/2022 (Friday)

Time: 3.00 pm – 4.00 pm

Venue: Google Meet
Google Meet joining info
Video call link: https://meet.google.com/knp-ovsy-mnx
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ABSTRACT

Fractional parabolic partial differential equations (FPPDEs) are frequently used to describe issues in engineering, economics, physics, and other fields. Even now, numerically solving these equations remains a significant issue. Consequently, several numerical techniques exist for getting their corresponding approximation equation of FPPDEs. In addition to these techniques, various families of iterative methods have also been presented and addressed in previous works, primarily in solving any system of linear equations constructed by these approximation equations. Therefore, we describe Caputo's implicit finite difference solution for the one-dimensional linear space-fractional diffusion equation (1DSFDE) and time-fractional diffusion equation (1DTFDE) based on the quarter-sweep Caputo's implicit finite difference approximation equation. To do this matter, both problems must be discretized using Caputo's space fractional derivative and Caputo's time-fractional derivative operators and second-order quarter-sweep central difference schemes to construct the corresponding approximation equation. Then we may build a linear system that has been solved iteratively using the Quarter-Sweep SOR (QSSOR) method. The numerical results of this iterative method have been compared to the numerical results of other known SOR methods such as Full-Sweep SOR (FSSOR) and Half-Sweep SOR (HSSOR). Finally, it is possible to conclude that the suggested iterative method outperforms the FSSOR and HSSOR methods.

All are Welcome