INSTITUTE OF MATHEMATICAL SCIENCES
UNIVERSITI MALAYA

SIRI SEMINAR KUMPULAN PENYELIDIKAN

Title: Approximation of Riesz Derivative and its Application.
Speaker: Prof. Dr. Vineet Kumar Singh.
Date: 13 December 2024 (Friday).
Time: 10 am – 11 am.
Venue: MM3, Level 2, Institute of Mathematical Sciences, Faculty of Science, Universiti Malaya.

ABSTRACT

In this work, we designed a numerical scheme based on approximation of Riesz derivative and matrix transform method (MTM) for space-time fractional super diffusion wave equations of orders $1<\alpha<2, 1<\beta<2$. A stable implicit computational technique is used to discretize the Caputo fractional derivative in the time domain, providing a $(3-\alpha)$-th order of convergence, while the space fractional derivative is discretized using the MTM. The error estimates in temporal and spatial directions have been investigated thoroughly. A theoretical analysis of the developed scheme is presented, including unconditional stability and convergence results. Further, it is highlighted that the designed algorithm gives β-th order convergence for the space direction. Some numerical tests are provided to verify the theoretical findings and establish the numerical stability of the proposed algorithm. The implementation and high efficiency of the suggested algorithm are shown through some numerical examples.

All are Welcome