MATH COLLOQUIUM SERIES

School of Mathematical Sciences
Universiti Sains Malaysia

AN EFFICIENT NUMERICAL APPROACH BASED ON CUBIC B-SPLINE FUNCTIONS FOR SOLVING TIME-FRACTIONAL DIFFUSION EQUATION INVOLVING CAPUTO-FABRIZIO DERIVATIVE

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Abstract. The purpose of this talk is to present the numerical solution of Caputo-Fabrizio time fractional diffusion equation by means of cubic B-spline functions. The Caputo-Fabrizio interpretation of fractional derivative involves a non-singular kernel that permits us to describe some class of material heterogeneities and the effect of memory more effectively. The proposed numerical technique relies on finite difference approach and cubic B-spline functions for discretization along temporal and spatial grids, respectively. A stability analysis has been carried out to confirm that the error does not amplify during computational process. Theoretically, the presented algorithm is second order convergent along time and space directions. The computational competence of the presented scheme is tested through some numerical examples. The results reveal that the current scheme is reasonably efficient and reliable to be used for solving the subject problem.

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