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NUMERICAL SOLUTION OF ONE -DIMENSIONAL HEAT EQUATION USING FINITE-DIFFERENCE METHODS

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Abstract

In the present paper numerical solutions to the heat equation are obtained by using the finite difference method. The forward time centered space (FTCS), the backward time centered space (BTCS) and Crank-Nicolson schemes are developed and applied to a simple test problem involving the one-dimensional heat equation. The accuracy of proposed schemes are applied to one test problem and results of running the MATLAB codes on finer meshes and with smaller time steps is analyzed. The applicability of three schemes BTCS, FTCS and Crank-Nicolson method is illustrated using simple test problem. Numerical results and stability graphs are presented.

Key Words : *Partial differential equations, Finite difference schemes, Crank-Nicolson method, Heat equation; Stability.*