

ABSTRACT

This thesis develops a numerical method based upon a rational approximation to the matrix exponential function having real roots for solving first-order hyperbolic partial differential equations. The method is third-order accurate in space and time and do not require the use of complex arithmetic. In this method first-order spatial derivative appearing in the partial differential equation is approximated, then parallel algorithm is developed and tested on advection-equation with constant coefficient. The scheme developed is seen to be very accurate.