

1067-35-165

Katharine F Gurski* (kgurski@howard.edu), Department of Mathematics, Howard University, Washington, DC 20059, and **Stephen O'Sullivan**. *An Explicit Super-Time-Stepping Scheme for Non-Symmetric Parabolic Differential Equations.*

When a system of differential equations are dominated by a skew-symmetric component, the real eigenvalues are dominated by imaginary eigenvalues, and explicit numerical methods may suffer from a time step size that approaches zero in order to satisfy stability conditions. We present a new super-time-stepping method modeled on a Runge-Kutta scheme with multiplicative operator splitting which increases stability of the original super-time-stepping whenever the skew-symmetric term is nonzero. The new method is stable for skew symmetric dominated systems where the regular super-time-stepping scheme fails. This method is second order in time and the spatial order is determined by the user's choice of discretization scheme. We present a comparison between the two super-time-stepping methods to show the speed up available for any non-symmetric system using the nearly symmetric Black-Scholes equation as an example. (Received July 28, 2010)