1065-65-190 **Katharine F Gurski*** (kgurski@howard.edu), Department of Mathematics, Howard University, Washington, DC 20059. *An Explicit Super-Time-Stepping Scheme for Non-Symmetric Parabolic Problems.*

Explicit numerical methods for the solution of a system of differential equations may suffer from a time step size that approaches zero in order to satisfy stability conditions. When the differential equations are dominated by a skew-symmetric component, the problem is that the real eigenvalues are dominated by imaginary eigenvalues. We compare results for stable time step limits for the super-time-stepping method of Alexiades, Amiez, and Gremaud (super-time-stepping methods belong to the Runge-Kutta-Chebyshev class) and a new method modeled on a predictor-corrector scheme with multiplicative operator splitting. This new explicit method increases stability of the original super-time-stepping whenever the skew-symmetric term is nonzero, which occurs in particular convection-diffusion problems and more generally when the iteration matrix represents a nonlinear operator. The new method is stable for skew symmetric dominated systems where the regular super-time-stepping scheme fails. 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 September 13, 2010)