

UWM Math Colloquium

M.S. Defense

Wednesday, April 30, 2008, 3:00 PM, EMS E423

"Development of a Second Order Exponential Time Differencing Scheme"

by

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Abstract:

Khaliq et al. [7] recently developed a fourth order smoothing scheme for reaction-diffusion systems with nonsmooth data, as such problems are of great relevance in diverse applications. Their scheme is a new version of a fourth order Exponential Time Differencing Runge-Kutta Scheme (ETDRK) developed by Cox and Matthews [1] improving computational difficulties by the following approaches. For the ETDRK scheme a diagonal Pade approximation of matrix exponential functions together with partial fraction techniques were used to avoid numerical instability. To eliminate oscillations that arise due to nonsmooth data, several steps of a proper damping device were applied at the start. For the development of the second order exponential time differencing scheme in this thesis, we follow these ideas. Numerical experiments are presented to evaluate the performance of the new scheme and to compare its efficiency and accuracy to some numerical standard methods.