1048-65-317 **Alina Chertock*** (chertock@math.ncsu.edu), North Carolina State University, Department of Mathematics, Campus Box 8205/ HA 243, Raleigh, NC 27695, **Charles Doering** (doering@umich.edu), Univeristy of Michigan, Department of Mathematics, 328 WH East Hal, Ann Arbor, MI 48109, **Eugene Kashdan** (ekashdan@post.tau.ac.il), Tel Aviv University, Department of Applied Mathematics, 69978 Tel Aviv, Israel, **Alexander Kurganov** (kurganov@math.tulane.edu), Tulane University, Mathematics Department, 6823 Saint Charles Ave, New Orleans, LA 70118, and **Guergana Petrova** (gpetrova@math.tamu.edu), Texas A&M University, Department of Mathematics, College Station, TX 77843. *Fast Explicit Operator Splitting Method for Convection-Dominated Problems.*

Convection-diffusion equations model a variety of physical phenomena. Computing solutions of these equations is an important and challenging problem, especially in the convection-dominated case, in which viscous layers are so thin that one is forced to use underresolved methods that may be unstable. If an insufficient amount of physical diffusion is compensated by an excessive numerical viscosity, the underresolved method is typically stable, but the quality of the resolution may be severely affected. At the same time, the use of dispersive schemes may cause spurious oscillations that may, in turn, trigger numerical instabilities.

I will present a special operator splitting technique that may help to overcome these difficulties by numerically preserving a delicate balance between the convection and diffusion terms, which is absolutely necessary when an underresolved method is used. The performance of the splitting-based methods will be illustrated on a number of numerical examples including the polymer system arising in modeling of the flooding processes in enhanced oil recovery, systems modeling the propagation of passive pollutant in shallow water and in a random stirring flow field, and the incompressible Navier-Stokes equations. (Received February 10, 2009)