1058-35-52 **Dmitri Kuzmin*** (kuzmin@math.uh.edu), Department of Mathematics, University of Houston, 651 Philip G. Hoffman Hall, Houston, TX 77204-3008. *Flux and slope limiters for finite element approximations to convection-dominated transport equations.*

High-resolution finite element schemes are developed for convection-dominated problems with steep fronts. Algebraic and geometric design principles are reviewed in the context of scalar transport equations. The oscillatory part of a continuous Galerkin discretization is decomposed into a sum of antidiffusive fluxes. Multidimensional flux limiters are applied to control the growth of local extrema.

A new slope limiter is proposed for enforcing monotonicity in the context of discontinuous Galerkin methods. The upper and lower bounds for admissible variations are determined using the maxima/minima of centroid values over the set of elements meeting at a vertex. Within each element, the derivatives of DG solutions are limited in a hierarchical manner. The proposed limiting strategy is designed to maintain high accuracy at smooth extrema. No free parameters or troubled cell markers are involved. An evaluation of the presented limiting tools is performed for a 2D benchmark problem. (Received January 25, 2010)