1086-65-1042 **Xianping Li*** (xianpingl@uca.edu) and **Weizhang Huang** (huang@math.ku.edu). *Discrete maximum principle for the finite element solution of time-dependent anisotropic diffusion problems.*

New results that guarantee the satisfaction of discrete maximum principle (DMP) for anisotropic diffusion problems are presented. Anisotropic diffusion problems arise in the various fields of science and engineering including plasma physics, petroleum engineering, and image processing. The continuous solution satisfies the maximum principle. However, standard numerical methods can produce spurious oscillations when they are used to solve those problems. A common approach to avoid this difficulty is to design a proper numerical scheme and/or a proper mesh so that the numerical solution validates the DMP.

In our research, mesh adaptation via metric specification is applied for the finite element approximation of anisotropic diffusion problems. For stationary problems, "anisotropic non-obtuse angle condition" is developed for a mesh such that the numerical solution is guaranteed to satisfy DMP. This is the first available theoretical results that guarantees the satisfaction of DMP for anisotropic diffusion problems. For time-dependent problems, the conditions for mesh and corresponding time step size are developed to guarantee the satisfaction of DMP. Numerical examples are presented to support the theoretical results. (Received September 18, 2012)