1071-65-83 **Weizhang Huang*** (huang@math.ku.edu), 1460 Jayhawk Boulevard, Room 405, The University of Kansas, Lawrence, KS 66045. *Mesh adaptation for the finite element solution of heterogeneous anisotropic diffusion problems.*

Anisotropic diffusion problems arise in the various areas such as plasma physics, petroleum engineering, and image processing. For those problems standard numerical methods can produce spurious oscillations in computational solutions. A common strategy to avoid the difficulty is to employ a scheme satisfying the discrete maximum principle (DMP). For isotropic diffusion problems, a mesh satisfying the well-known non-obtuse angle condition guarantees the satisfaction of DMP by a linear finite element solution. In this talk we will show that a mesh satisfying a generalization of the non-obtuse condition will guarantee the satisfaction of DMP by the linear finite element solution for anisotropic diffusion problems. We will also present several variants of the new condition and discuss their use in developing metric tensors to account for DMP satisfaction and the combination of DMP satisfaction and mesh adaptivity. These metric tensors are needed in the practice of anisotropic generation and adaptation. Numerical examples are given to demonstrate the features of schemes based on DMP satisfaction and mesh adaptation. (Received February 21, 2011)