

Anisotropic Mesh Adaptation and Discrete Maximum Principle for Anisotropic Diffusion Problems

Abstract

Anisotropic diffusion problems arise in many fields of science and engineering, such as Plasma Physics, Petroleum Engineering and Image Processing. Spurious solutions (which do not have physical meaning) may occur in the numerical solution of problems with significant anisotropy when standard finite element, finite difference and finite volume methods are utilized in the numerical computations. In that case, the numerical solution is said to violate discrete maximum principle (DMP). Numerous research has been done on DMP for anisotropic diffusion problems, and most of them have improvement but none of them can guarantee the satisfaction of DMP. In this talk, I will introduce the anisotropic non-obtuse angle condition which guarantees that the linear finite element solution to satisfy the discrete maximum principle. The background of anisotropic diffusion problems and anisotropic mesh adaptation will be introduced.