1145-65-778   **Hengguang Li*** (`li@wayne.edu`), Department of Mathematics, Wayne State University, Detroit, MI 48202, and **Xun Lu**. *The finite element conditioning on a class of anisotropic meshes.*

New 3D anisotropic mesh algorithms were proposed for the finite element method to approximate elliptic equations with singularities. These algorithms are simple, intuitive, and impose less geometric constraints on the domain. The resulting mesh is generally anisotropic and the associated numerical approximation has optimal convergence. In this talk, we report new developments in these algorithms both in 2D and 3D, especially sharp estimates on the condition numbers of the finite element stiffness matrices from these meshes. (Received September 14, 2018)