Least-Squares Finite Element Methods

JaEun Ku
Department of Mathematics
Oklahoma State University

Least-squares finite element methods have drawn considerable attention to approximate the solutions of second-order elliptic partial differential equations, elasticity, Stokes and Navier-Stokes equations. In this talk, we will discuss a first-order system least-squares method(FOSLS) based on a first-order system representing a second-order equation. Advantages of least-squares methods over the standard/mixed Galerkin methods will be addressed and various new error estimates of these methods will be presented. In particular, we will provide optimal error estimates with respect to the regularity and approximate spaces when the original problem has low regularity solutions. These estimates can be used to justify the process of using linearization step to solve nonlinear problems. In this regard, possible way of using least-squares solver for Stokes equations to approximate the solutions of Navier-Stokes equations will be briefly discussed.