

1161-65-255

Lin Mu*, University of Georgia, University of Georgia. *The Recent Development of Weak Galerkin Finite Element Methods.*

In this talk, we shall introduce the weak Galerkin finite element method (FEM), a new polygonal FEM, for solving partial differential equations. The key concept of discrete weak derivatives will be introduced and discussed for the development of numerical schemes. Weak Galerkin Method is a natural extension of the classical Galerkin finite element method with advantages in many aspects. For example, due to its high structural flexibility, the weak Galerkin finite element method is well suited to most partial differential equations on the general meshing by providing the needed stability and accuracy in approximation. In this talk, the speaker shall discuss the basics of weak Galerkin finite element methods (WG), including a priori error estimate and a posteriori error estimate. We start with second-order elliptic equations, for which WG shall be applied and explained in detail. Later, we shall extend our schemes to other CFD models, including Stokes equations, Brinkman equations, and Navier-Stokes equations. We shall discuss the new divergence preserving schemes and upwind stabilization techniques in designing the robust numerical schemes. (Received August 18, 2020)