TEXAS STATE UNIVERSITY

The rising STAR *of Texas*

Differential Equations and Applied Math Seminar

Dr. Chunmei Wang, Texas State University

11am-12pm December 1st, 2017

333 Derrick Hall

Title: Weak Galerkin Finite Element Methods for Partial Differential Equations

Abstract: Weak Galerkin (WG) is a new finite element method for approximating solutions to partial differential equations (PDEs). The differential operators in the variational forms are approximated by weak forms as generalized distributions. The WG discretization procedure often involves the solution of inexpensive problems defined locally on each element. The solution from the local problems can be regarded as a reconstruction of the corresponding differential operators. Conventional finite element methods (FEM) are based on weak forms for the underlying PDE problems. The fundamental difference between WG FEM and other existing FEMs is the use of weak functions and weak derivatives. Due to its great structural flexibility, WG FEM is well suited to most partial differential equations by providing stable and accurate approximations. We will introduce the basic ideas and a general framework for WG methods by using the second order elliptic equation as a motivating example. Furthermore, we will introduce a new WG finite element method called the primal-dual weak Galerkin method. Finally, we will present an application of WG in a fourth order PDE problem arising from fluorescence tomography.

Interested faculty and graduate students are encouraged to attend.