

# Differential Equations and Applied Math Seminar

Texas State University

2-3pm April 3, 2015

329 Derrick Hall

**Speaker:** Dr. Young Ju Lee, Texas State University

**Title:** Multi-grid Methods for Parameter Dependent Problems

**Abstract:** In this talk, we provide a new abstract framework for the convergence analysis of the subspace correction methods applied to the system of linear algebraic equations associated to the differential operator  $A + \alpha B$ , where two operators  $A$  and  $B$  have nonzero null spaces, but with no intersections. The framework leads to the convergence estimate that is independent of the parameter  $\alpha$  under newly proposed abstract assumption. This abstract framework in combinations with the Augmented Lagrangian Uzawa method is exploited to design multigrid methods to solve the finite element based discrete systems of the linear elasticity with weakly imposed symmetry. The method is proven to be convergent uniformly with respect to the mesh size and the parameter. A special case of our theory can provide a transparent and improved analysis for the multigrid methods developed by Cai et al. for the pseudo-stress formulations of Stokes equation in 2007 (SISC), thereby resolving the analytical gap for their numerical experiments. Some sample numerical experiments will also be presented.

Interested faculty and graduate students are encouraged to attend.