



HACETTEPE ÜNİVERSİTESİ MATEMATİK BÖLÜMÜ GENEL SEMİNERİ

(HACETTEPE UNIVERSITY MATHEMATICS GENERAL SEMINAR)

Tarih (Date): 27.05.2015, Çarşamba (Wednesday)

Saat (Time): 14:00

Yer (Place): Yaşar ATAMAN Seminer Salonu

Konuşmacı (Speaker): Prof. George Avalos

Başlık (Title): Qualitative and Quantitative Analysis of a Fluid-Structure PDE Interaction

Özet (Abstract) : In this talk we will present qualitative and numerical results for a partial differential equation (PDE) system which models a fluid-structure PDE of longstanding interest within the mathematical literature. The coupled PDE model under discussion involves a Stokes or Navier-Stokes system, which evolves on a three dimensional domain, interacting with a fourth order plate equation which evolves on a flat portion of said fluid domain. Among other technical difficulties we note that, inasmuch as the fluid velocity does not vanish on all of the boundary, the associated pressure variable cannot be eliminated via the classic Leray Projector. We will discuss how wellposedness of this fluid-structure dynamics is eventually attained via a certain variational "inf-sup" (or Babuska-Brezzi) formulation. Subsequently, we will show how our constructive proof of wellposedness naturally gives rise to a finite element method for numerically approximating solutions to the fluid-structure dynamics. Time permitting, we will also discuss ongoing work for the fully nonlinear model, where the fluid component of the dynamics is governed by the Navier-Stokes, rather than the Stokes equations.