

**Graduate Seminar in Fluid Mechanics, 530.808**  
**Friday, February 24, 2012 in Hackerman Hall # B17**  
**Department of Mechanical Engineering**

**3:00 P.M. PRESENTATION**

***“Thermal analysis of cancerous breast model”***

Presented by **Rajeev Hatwar** (Adviser: Cila Herman)

**ABSTRACT:** Breast cancer is one of the most frequently diagnosed forms of cancer in women and early diagnosis is the key to survival. Tumors generate more heat than healthy tissue and due to this heat a temperature rise is observed on the skin surface above the tumor. This rise in temperature can be measured using thermography and thus this can be used to detect the presence of tumor. Thermography is fast coming out to be a prominent technique for the cancer diagnosis especially after the recent advancement in infrared imaging.

The present talk starts with a literature review which highlights the growing importance of thermography as a diagnostic tool. This is followed by the analysis of a cancerous breast model using COMSOL. The effect of various parameters (tumor size, location, metabolic heat generation and blood perfusion rate) on the surface temperature distribution has been analyzed. Further the effect of cooling load on the enhancement of the temperature difference between normal and cancerous case has been analyzed. Aim of this analysis is to be able to diagnose the presence of a tumor and to estimate its location and dimensions using surface temperature distribution.

**3:30 P.M. PRESENTATION**

***“Preparation of an upcoming experiment on the interaction between turbulent boundary layer and a compliant wall”***

Presented by **Cao Zhang** (Adviser: Joseph Katz)

**ABSTRACT:** The coupling between turbulent boundary layer and a compliant wall has the potential to suppress noise and reduce drag. But the mechanism of fluid/solid interaction is still not very clear. An experimental study aiming at this interaction is under preparation. The goal of this experiment is the simultaneous measurements of both flow field and wall deformation. The compliant wall is made of Polydimethylsiloxane (PDMS) and its refractive index can be matched by using NaI solution to reduce the light reflection at interface. To measure the wall deformation, several techniques with different measurement ranges and precisions are being tested. All those techniques and the manufacture of a compliant wall will also be discussed in this presentation.