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Seminar

Speaker: **Professor Jeff Wu**
Georgia Institute of Technology

Title: **Two problems in computer experiments: multi-fidelity simulations and calibration**

Time: **12:00 – 1:00pm, *Tuesday*, April 9, 2013**

Place: **552 Hill Center**

Abstract

Because of the advances in complex mathematical models and fast computer codes, computer experiments have become popular in engineering and scientific investigations. In this talk I will present work on two such problems.
Paert I. Considers deterministic computer experiments with real-valued tuning parameters which determine the accuracy of the numerical algorithm. A prominent example is finite element analysis with its mesh density as the tuning parameter. The aim of this work is to integrate computer outputs with different tuning parameters. Novel nonstationary Gaussian process models are proposed to establish a framework consistent with the results in numerical analysis. Numerical studies show the advantages of the proposed method over existing methods. The methodology is illustrated with a problem in casting simulation.
Part II. Calibration parameters in deterministic computer experiments are those attributes that cannot be measured or available in physical experiments or observations. Kennedy-O'Hagan (2001) suggested an approach to estimate them by using data from physical experiments and computer simulations. We study the estimation problem and show that a simplified version of the original KO method leads to asymptotically inconsistent calibration. This calibration inconsistency can be remedied by modifying the original estimation procedure. A novel calibration method, called the L_2 calibration, is proposed and proven to be consistent and enjoys optimal convergence rate. A numerical example and some mathematical analysis are used to illustrate the source of the inconsistency problem.
(joint work with Rui Tuo, Chinese Academy of Sciences)