

STATISTICS COLLOQUIUM

MONDAY, FEBRUARY 25, 2008

TALK: 4:00 PM — SCIENCE CENTER RM. 705

RECEPTION: 5:15 PM — SCIENCE CENTER, 7TH FLOOR

“Binary Time Series Modeling with Application to Adhesion Frequency Experiments”

Ying Hung
Department of Statistics
Georgia Tech

ABSTRACT

Cell adhesion plays an important role in many physiological and pathological processes. The only published method for measuring the kinetic rates of cell adhesion is the repeated adhesion frequency. Traditional analysis of adhesion frequency experiments assumes that the adhesion test cycles are independent Bernoulli trials. This assumption is often violated in practice. The major part of the talk will focus on a new binary time series model motivated by the analysis of repeated adhesion frequency tests. To assess the adequacy of distribution assumptions on the dependent binary data with random effects, a goodness-of-fit statistic will be proposed. The asymptotic distribution of the goodness-of-fit statistic is derived and its finite-sample performance is examined via a simulation study. Application of the proposed methodology to real data from a T-cell experiment at Georgia Tech provides some valuable information, including quantifying the *memory* effects in cells and molecules. This information is crucial to the body's defense in the immune system.

The second part of the talk shall briefly touch upon my new work in computer experiments with branching and nested factors. In many experiments, some of the factors exist only within the level of another factor. Such factors are often called nested factors. A factor within which other factors are nested is called a branching factor. Design and analysis of experiments with branching and nested factors are challenging and have not received much attention in the literature. Motivated by a computer experiment in a machining process, we develop optimal Latin hypercube designs and kriging methods that can accommodate branching and nested factors. Through the application of the proposed methods, optimal machining conditions and tool edge geometry are attained, which resulted in a remarkable improvement in the machining process.