

STATISTICS COLLOQUIUM

THURSDAY, MARCH 01, 2007

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

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

“Robust Parameter Design for Automatically Controlled Systems and Nanostructure Synthesis”

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ABSTRACT

Robust parameter design is a technique to desensitize the noise variation on the output by finding a control factor setting that reduces the effect of uncontrollable noise factors on the output. This research focuses on developing comprehensive frameworks for developing robust parameter design methodology for dynamic systems with automatic control and for synthesis of nanostructures. The two areas, which are technologically quite different, pose plenty of unique statistical challenges in experimental planning, modeling, and optimization.

The major part of the talk will focus on the integration of robust parameter design with feedback control. In many dynamic processes, the optimal feedback control law depends on the parameter design solution and vice-versa. The need for an integrated approach that combines the two methods is therefore evident. A parameter design methodology in the presence of feedback control is developed for processes of long duration. Systems that follow a pure-gain dynamic model are considered and the best proportional-integral and minimum mean squared error control strategies are developed by using robust parameter design. The proposed method is illustrated using a simulated example and a case study in a urea packing plant.

The second part of the talk shall briefly touch upon some of the statistical challenges encountered in ensuring robustness in nanostructure synthesis process; some recent developments and opportunities for future research.