Optimal Design of Experiments

(Org: **Julie Zhou** (University of Victoria))

CHING-SHUI CHENG, University of California, Berkeley
Optimal Block Designs and Graphs

Each graph can be considered as a block design of block size two. On the other hand, graphs can be constructed from block designs in natural ways. I will discuss how some problems on optimal block designs are related to problems in graph theory. In particular, I will present an application of a recent result on root systems by Peter Cameron.

JOHN STUFKEN, University of Georgia
Some combinatorial structures useful in design of experiments

We consider two combinatorial structures that arise from statistical design of experiments. The first comes from efficiency considerations in survey sampling, and leads to the need for block designs with a certain property of the concurrences. The second structure comes from studying the maximum number of factors in mixed level orthogonal arrays of strength 2 with a specified number of runs.

BOXIN TANG, Simon Fraser University
Optimal Fractions of Two-level Factorials under a Baseline Parametrization

Two-level fractional factorial designs are considered under a baseline parametrization. The criterion of minimum aberration is formulated in this context and optimal designs under this criterion are investigated. The underlying theory as well as the concept of isomorphism turn out to be significantly different from their counterparts under orthogonal parametrization, and this is reflected in the optimal designs obtained.

WENG KEE WONG, UCLA
Algorithms for Generating Minimax Optimal Experimental Designs

We explore modern optimization methods in physics, engineering and operation research for generating minimax optimal designs for regression problems. Of particular interest is the Particle Swarm Optimization approach, which is a promising, stochastic based meta-heuristic optimization method that uses only objective function values and does not require derivative information. We apply the method to solve several types of minimax design problems in linear and nonlinear regression problems and report the quality of the optimal designs.

JANE YE, University of Victoria
Minimizing the condition number to construct design points for polynomial regression models

For the polynomial regression models of degree p with design space [-1, 1], we introduce a new optimal design criterion by minimizing the condition number of the information matrix. It is well-known that the condition number is usually nonsmooth. However, we can show that for the polynomial regression models, the condition number is continuously differentiable. We have also shown that our new optimal designs are symmetric, and the number of support points is exactly p+1.