



Operations Research Seminar

Stochastic Trust Region Gradient Method (STRONG): A Design-of-Experiment-Based Simulation Optimization Framework

Hong Wan

Industrial Engineering
Purdue University

Armed forces around the world are considering radical transformations to their structures and strategies because of the information revolution and the changing global environment. Senior leadership continually face decisions on how best to structure, modernize, organize, and employ forces in an increasingly uncertain future. For many of these problems analytical methods are not applicable, and large scale experimentation is not feasible. Simulation provides a valuable tool for addressing these types of problems. We develop a new Design-of-Experiment-Based simulation optimization framework, called Stochastic Trust Region Gradient Method (STRONG), to efficiently identify the optimal parameter settings for various performance measures. The work is based on Response Surface Methodology (RSM). RSM is a metamodel-based optimization method. Its strategy is to explore small subregions of the parameter space in succession instead of attempting to explore the entire parameter space directly. This method has been widely used for simulation optimization. However, RSM has two significant shortcomings: Firstly, it is not automated. Human involvements are usually required in the search process. Secondly, RSM is heuristic without convergence guarantee. STRONG solves these two problems. It combines the traditional RSM framework with the trust region method for deterministic optimization to achieve convergence property and eliminate the requirement of human involvement. Combined with appropriate experimental designs, especially screening experiments, STRONG has the potential of solving high-dimensional problems efficiently. The effort will allow analysts to rapidly design the complex systems with desired optimal performances with the simulation model and facilitate the decision making process significantly.

Date: Tuesday, January 22, 2008

Time: 15:00-16:00

Location: Glasgow 115