

Speaker: C. F. Jeff Wu

Title: Minimum-Energy Designs: From Nanostructure Synthesis to Sequential Optimization

Abstract: Motivated by a problem in the synthesis of nano-wires, a sequential space-filling design, called Sequential Minimum Energy Design (SMED), is proposed for exploring and searching for the optimal conditions in complex black-box functions. The SMED is a novel approach to generate designs that are model independent, can quickly carve out regions with no observable nano-structure morphology, allow for the exploration of complex response surfaces, and can be used for sequential experimentation. SMED can be viewed as a sequential design procedure for stochastic functions and a global optimization procedure for deterministic functions. The basic idea has been developed into a practically implementable algorithm, and guidelines for choosing the parameters of the design have been proposed. Convergence of the algorithm has been established under certain regularity conditions. Performance of the algorithm has been studied using experimental data on nano-wire synthesis as well as standard test functions.

(Joint work with V. R. Joseph, Georgia Tech and T. Dasgupta, Harvard U.)