Stanford University
Departments of Mathematics and Statistics

PROBABILITY SEMINAR

4:15pm, Monday, October 6, 2014
Sequoia Hall Room 200
Cookies served at 3:45pm, 1st floor Lounge.

Speaker: Tze Leung Lai
Department of Statistics,
Stanford University

Title: Markov Chain Monte Carlo with Sequential State Substitutions: Theory and Applications

Abstract:
Motivated by applications to adaptive filtering that involves joint parameter and state estimation in hidden Markov models, we describe a new approach to MCMC, which uses sequential state substitutions for its Metropolis-Hastings-type transitions. The basic idea is to approximate a target distribution by a weighted distribution of $M$ representative atoms, chosen sequentially by an MCMC scheme so that the distribution converges weakly to the target distribution as the number $K$ of iterations approaches infinity. Making use of coupling arguments and bounds on the total variation norm of the difference between the target distribution and the empirical measure defined by the sample paths of the MCMC scheme, we develop an asymptotic theory of MCMC with sequential state substitutions. In particular, we establish the asymptotic normality of the Monte Carlo estimate of a functional of the target distribution and provide a consistent estimator of its standard error. Applications to adaptive filtering are also given.