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## Computational Mathematics Seminar Series

## Stochastic Differential Equations and Optimal Control with Constraints

Haomin Zhou, Georgia Institute of Technology

Digital Media Center 1034  
April 19, 2016 - 03:30 pm

## Abstract:

We design a new stochastic differential equation (SDE) based algorithm to efficiently compute the solutions of a class of infinite dimensional optimal control problems with constraints on both state and control variables. The main ideas include two parts. 1) Use junctions to separate paths into segments on which no constraint changes from active to in-active, or vice versa. In this way, we transfer the original infinite dimensional optimal control problems into finite dimensional optimizations. 2) Employ the intermittent diffusion (ID), a SDE based global optimization strategy, to compute the solutions efficiently. It can find the global optimal solution in our numerical experiments. We illustrate the performance of this algorithm by several shortest path problems, the frogger problem and generalized Nash equilibrium examples. This talk is based on joint work with Shui-Nee Chow (Math, Georgia Tech), Magnus Egerstedt (ECE, Georgia Tech), Wuchen Li (Math, Georgia Tech), and Jun Lu (Wells Fargo).

## Speaker's Bio:

Dr. Haomin Zhou received his B.S. in pure mathematics from Peking University, China in 1991, his M.S. in computational mathematics from Peking University and M.Phil in applied mathematics from the Chinese University of Hong Kong in 1994 and 1996 respectively, and his Ph.D. in applied mathematics from University of California, Los Angeles in 2000. He had spent 3 years in California Institute of Technology as a postdoctoral scholar and von Karman instructor, before he joined Georgia Institute of Technology as an assistant professor in 2003. His research interests are on numerical analysis and scientific computing, specialized in multi-scale PDE computations, numerical analysis for stochastic differential equations, and wavelet based PDE techniques for image and video processing. He is a recipient of the NSF CAREER AWARD in applied and computational mathematics in 2007.

This lecture has a reception @ 03:00 pm

