UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

Colloquium

Dr. Jinqiao Duan

(IPAM / UCLA)

“Perspectives in Stochastic Dynamics – Modeling, Analysis and Computation”

Abstract: Dynamical systems arising in engineering and science are often subject to random influences (“noise”). The noisy processes may be Gaussian or non-Gaussian, which are modeled by Brownian motion or α-stable Levy motion, respectively. Non-Gaussianarity of the noise manifests as nonlocality at a “macroscopic” level. Stochastic partial/ordinary differential equations with Brownian motion or Levy motion are appropriate models for these systems.

To understand dynamics under uncertainty, topological, geometric and analytical approaches are taken to examine the quantities that carry dynamical information and the structures that act as dynamical skeletons. In particular, within the analytical approaches, a quantity called “escape probability” is investigated and computed in order to describe transitions between dynamical regimes. This leads to consideration of a deterministic nonlocal partial differential equation. Moreover, the non-Gaussianarity index α in Levy motion is estimated by solving an inverse problem for this nonlocal partial differential equation, with the observation on escape probability.

The speaker will fist present an overview of available theoretical and numerical techniques for investigating stochastic dynamical systems, highlighting some delicate and profound impact of noise on dynamics. Then, he will focus on understanding stochastic dynamics by examining “escape probability”, in the context of prototypical examples in biophysical and physical settings.

Wednesday, February 13th, 2013

Surge 284

Tea Time 3:40 p.m. – Talk Begins 4:10 p.m.