

For favour of posting



DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE  
THE UNIVERSITY OF HONG KONG

50<sup>th</sup> Anniversary Seminar Series

**Mr. Xiongtao DAI**

University of California, Davis  
USA

will give a talk  
entitled

**PRINCIPAL COMPONENT ANALYSIS FOR FUNCTIONAL  
DATA ON RIEMANNIAN MANIFOLDS AND SPHERES**

Abstract

Functional data analysis on nonlinear manifolds has drawn recent interest. Sphere-valued functional data, which are encountered for example as movement trajectories on the surface of the earth, are an important special case. In this talk, we consider a principal component analysis for smooth Riemannian manifold-valued functional data, which respects the intrinsic geometry of the manifold. Riemannian functional principal component analysis (RFPCA) is carried out by first mapping the manifold-valued data through Riemannian logarithm maps to linear tangent spaces around the time-varying Frechet mean function, and then performing a classical multivariate functional principal component analysis. Representations of the sample functions and the eigenfunctions on the original manifold are then obtained with exponential maps. We derive a central limit theorem for the mean function, as well as root- $n$  uniform convergence rates for other model components. Our applications include a novel framework for the analysis of longitudinal compositional data, achieved by mapping longitudinal compositional data to trajectories on the sphere, illustrated with longitudinal fruit fly behavior patterns. Riemannian functional principal component analysis is shown to be superior in terms of trajectory recovery and predictive power in comparison to an unrestricted method.

on

**Tuesday, January 23, 2018**

*(Refreshments will be served from 10:15 a.m. outside Room 301 Run Run Shaw Building)*

**10:30 a.m. – 11:30 a.m.**

at

Room 301, Run Run Shaw Building

**Visitors Please Note that the University has limited parking space. If you are driving please call the Department at 3917 2466 for parking arrangement.**

ALL INTERESTED ARE WELCOME