

# COLLOQUIUM

Department of Statistics and Probability  
Michigan State University

**Fang Yao**

University of Toronto

## Functional Mixture Regression

Tuesday, November 10, 2009

A405 Wells Hall

10:20 a.m. - 11:10 a.m.; Refreshments: 10:00 a.m.

### Abstract

In classical functional linear models the relationship between the scalar response and the functional predictor process is often assumed to be identical for all subjects. Motivated by both practical and methodological considerations, we relax this assumption and propose a new class of functional regression models that allow the regression structure to vary for different groups of subjects. By applying functional principal component analysis to the predictor process, these new functional regression models are simplified to a framework that is similar to classical mixture regression models. This leads to the proposed approach named as Functional Mixture Regression (FMR). We establish the consistency of FMR in terms of estimation and prediction, in which the major technical difficulties arise from the facts that the predictor variables in our functional mixture framework are unobservable and that the resulting estimators do not possess analytic expressions. We also show that estimation of FMR can be readily carried out using existing softwares implemented for functional principal component analysis and mixture regression. The practical necessity and empirical performance of FMR are illustrated through numerical simulations as well as applications to a fertility and longevity analysis of female medflies and a human growth study. Corresponding results demonstrate that the proposed approach achieves substantial gains over traditional functional linear models.

*To request an interpreter or other accommodations for people with disabilities, please call the Department of Statistics and Probability at 517-355-9589.*