

Associate Professor Zudi LU

School of Mathematical Sciences, The University of Adelaide, SA5005, Australia

Title: Nonlinear spatial and spatiotemporal modeling: A review

Abstract: In this talk I shall first review some developments in exploring the nonlinearity in spatial and spatio-temporal data, in particular some recent work by my coauthors and myself. For example, nonparametric methods have been very popular in the last couple of decades in time series and regression analysis, but little of such development has taken place for spatial models. A rather obvious reason for this is the curse of dimensionality. We proposed a semiparametric spatial regression approach to avoid this problem. An application of the methodology to the classical Mercer wheat data set indicates that one directional component appears to be nonlinear, which has gone unnoticed in earlier analyses. We proposed an adaptive varying-coefficient spatio-temporal model allowing for data observed irregularly over space and regularly in time. It is capable of capturing possible nonlinearity (both in space and in time) and nonstationarity (in space) by allowing the autoregressive coefficients to vary with both spatial location and an unknown index variable. An application of the methodology to a climatic data set of sea level pressure in the North Sea illustrates that our adaptive coefficient model outperforms all other naive and linear forecasts, with the smallest overall mean predictive error.