

# Nonparametric Estimation and Dimension Reduction in Nonstationary Time Series

S. Yaser Samadi

Department of Mathematics  
Southern Illinois University, Carbondale, IL  
e-mail: ysamadi@siu.edu

In the context of nonstationary time series analysis, we are interested in making inference about the conditional mean and the conditional variance. Dimension reduction techniques play an important role in reducing the complexity of data. We develop sufficient dimension reduction methods for nonlinear and nonstationary time series data. We introduce a notion of central mean and central variance subspaces (CMCVS) to capture the information contained in the conditional mean and variance. Nonparametric methods are used to estimate the CMCVS. The proposed estimators are shown to be consistent. Numerical studies are conducted to corroborate our theoretical results.

**Keywords.** Dimension reduction, central mean and variance subspaces, kernel smoother, nonparametric estimation, nonstationary time series.