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Recent Advances in Statistical Inference for Stochastic PDEs

We consider a parameter estimation problem for finding the drift coefficient for a large class of parabolic Stochastic PDEs driven by additive space-time noise (white in time, and possible colored in space).

In the first part of the talk, we derive several different classes of estimators based on the first N Fourier modes of a sample path observed continuously on a finite time interval. Mainly, we will focus on a new type of estimators for the drift parameter of SPDEs, called the Trajectory Fitting Estimator (TFE). This estimator can be viewed as an analog to the TFE for stochastic ordinary differential equations or to the least square estimator from the time series analysis. We will discuss consistency and asymptotic normality of such estimators as $N \to \infty$

In the second part of the talk we will discuss the simple hypothesis testing problem for the same class of SPDEs. We introduce the notion of asymptotically the most powerful test, and find explicit forms of such tests in two asymptotic regimes: large time asymptotics, and increasing number of Fourier modes.

We will conclude the talk with several illustrative examples.