Mathias Trabs

Parameter estimation for stochastic PDEs based on discrete observations in time and space

Motivated by random phenomena in natural science as well as by mathematical finance, stochastic partial differential equations (SPDEs) have been intensively studied during the last fifty years with a main focus on theoretical analytic and probabilistic aspects. Thanks to the exploding number of available data and the fast progress in information technology, SPDE models become nowadays increasingly popular for practitioners, for instance, to model neuronal systems or interest rate fluctuations to give only two examples. Consequently, statistical methods are required to calibrate this class of complex models. We study the parameter estimation for parabolic, linear, second order SPDEs observing a mild solution on a discrete grid in time and space. A high-frequency regime is considered where the mesh of the grid in the time variable goes to zero. Focusing on volatility estimation, we provide an explicit and easy to implement method of moments estimator based on the squared increments of the process. The estimator is consistent and admits a central limit theorem. This is established moreover for the estimation of the integrated volatility in a semi-parametric framework. While these first results require more observations in time than in space, we finally construct estimators in the complementary regime.

The talk is based on joint works with Markus Bibinger and Florian Hildebrandt.