Backward SDE Methods for Nonlinear Filtering Problems

Yanzhao Cao
Auburn University, USA
Email: yzc0009@auburn.edu

A nonlinear filtering problem can be classified as a stochastic Bayesian optimization problem of identifying the random state of a stochastic dynamical system given noisy observations of the system. Well known numerical simulation methods include unscented Karlman filters and particle filters. In this talk, we attempt to construct efficient numerical methods using forward backward stochastic differential equations. The backward SDEs for the nonlinear filtering problems are the counter parts of Fokker-Planck equations for SDEs with no observation constraints. In this talk, we will describe the process of deriving such backward SDEs as well as the corresponding high order numerical algorithms for nonlinear filtering problems.