Design for estimation of drift parameter in fractional diffusion system

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Abstract

The present talk is devoted to the large sample asymptotic properties of the Maximum Likelihood Estimator (MLE) for the signal drift parameter ϑ in a partially observed and controlled fractional diffusion system.

Namely, we consider real-valued functions $x = (x_t,\, t \geq 0)$ and a process $Y = (Y_t,\, t \geq 0)$, representing the signal and the observation respectively, governed by the following homogeneous linear system of ordinary and stochastic differential equations:

$$\left\{ \begin{array}{rcl} dx_t &=& -\vartheta x_t dt + u(t)dt\,, \quad x_0 = 0\,, \\ dY_t &=& \mu x_t dt + dV_t^H\,, \quad Y_0 = 0. \end{array} \right. \tag{1}$$

where $u = (u(t),\, t \geq 0)$ is a control of the signal. Here, $V^H = (V_t^H,\, t \geq 0)$ is normalized fBm with Hurst parameter $H \in (0,1)$ and the coefficients ϑ and $\mu \neq 0$ are constants.

We suppose that parameter $\vartheta > 0$ is unknown and is to be estimated given the observed trajectory $Y^T = (Y_t,\, 0 \leq t \leq T)$ for a control u in the proper class.