Asymptotic properties of Maximum Likelihood Estimator for partially observed fractional diffusion system

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Abstract

We study long time asymptotic properties of the Maximum likelihood Estimator (MLE) for the signal drift parameter ϑ in a partially observed fractional diffusion system:

$$\begin{cases} dX_t &= -\vartheta X_t dt + dV_t^H\,, \quad X_0 = 0\,, \\ dY_t &= \mu X_t dt + dW_t^H\,, \quad Y_0 = 0. \end{cases}$$

where $V^H = (V_t^H,\, t \geq 0)$ and $W^H = (W_t^H, t \geq 0)$ are independent normalized fractional Brownian motions with the same Hurst parameter H belonging to $(0, 1)$.

Using the method of weak convergence of likelihood due to I. Ibragimov and R. Khasminskii, consistency, asymptotic normality and convergence of the moments are established for MLE. The proof is based on Laplace transform computations. Results for partially observed problem with dependant noise and for a totally observed fractional Ornstein-Uhlenbeck diffusion problem will also be discussed.