Parameter estimation in stochastic heat equation with fractional Brownian motion

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We study stochastic heat equations with three types of noises: white noise, fractional Brownian noise and a mixed fractional Brownian noise. We investigate the covariance structure, stationarity, and asymptotic behavior of the solution for each case.

For the stochastic heat equation with white noise we construct a strongly consistent and asymptotically normal estimator of diffusion parameter.

For the equation driven by a fractional Brownian motion we construct strongly consistent estimators of two unknown parameters, namely, the diffusion parameter σ and the Hurst parameter $H \in (0,1)$. We also prove joint asymptotic normality of the estimators in the case $H \in (0, \frac{3}{4})$.

For the stochastic heat equation with mixed fractional Brownian motion we construct a strongly consistent estimator for the Hurst index H and prove its asymptotic normality for $H < 3/4$. Then assuming the parameter H to be known, we deal with joint estimation of the coefficients at Wiener process and at fractional Brownian motion.