Lower bounds for the density of solutions of SDEs driven by fractional Brownian motions

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Abstract.

We are concerned with the following class of equations driven by B on the time interval $[0,1]$:

$$X_t = a + \int_0^t V_0(X_s)ds + \sum_{i=1}^{d} \int_0^t V_i(X_s)dB_s^i, \tag{1}$$

We give some lower bounds for the density of solutions to equation (1) driven by a fractional Brownian motion with Hurst parameter H. In the one dimensional case, our study encompasses all parameters $H \in (0,1)$, while our higher dimensional analysis is restricted to the case $H > 1/2$.
We consider three cases which can be handled with different kind of techniques:

1. The one-dimensional case with additive noise, which can be handled via simple ODE techniques.

2. The one-dimensional situation, namely $m = d = 1$, where the equation can be solved thanks to a Doss-Sussman type methodology.

3. The case of a Hurst exponent $H > 1/2$, for which Young integration methods are available.

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