ON A COVARIANCE STRUCTURE OF SOME SUBSET OF SELF-SIMILAR GAUSSIAN PROCESSES

VIKTOR SKORNIAKOV
Vilnius University, Vilnius, Lithuania
e-mail: viktor.skorniakov@mif.vu.lt

Let $\gamma \in (0, 1)$, $\sigma \in (0, \infty)$, $l : [0, \infty) \to \mathbb{R}$ be fixed. Assume that $l$ is measurable and $l(0) = 1$. We consider a set of centred self-similar Gaussian processes \{(X_t)_{t \geq 0}\}. A process $(X_t)_{t \geq 0}$ belongs to the set considered, provided the following conditions hold:

(i) $X_0 \equiv 0$;

(ii) the covariance function is given by

$$R(s,t) = \sigma^2 (\min(s,t))^{2\gamma l \left( \frac{|s-t|}{\min(s,t)} \right)}, \quad \min(s,t) > 0. \quad (1)$$

We provide sufficient and necessary conditions for such process to admit a unique small scale limit [2] in the Skorokhod space. The considered class includes several well-known families of Gaussian processes, namely, sub-fractional Brownian motions [1], bi-fractional Brownian motions [3] and Riemann–Liouville processes.

References

