Abstract of the contributed talk

„Locally self-similar Gaussian processes: extremes and Pickands' constants"

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Pickands' double-sum method allows to obtain exact asymptotics of

$$\mathbf{P}\left(\sup_{t\in[0,T]} X(t) > u\right) \qquad \text{as} \quad u \to \infty\ , \tag{1}$$

where $\{X(t) : t \in [0,T]\}$ is a centered Gaussian process with continuous sample paths ([3], [4]). One of its classical applications deals with the class of *stationary* or *locally stationary* Gaussian process such that

$$\mathbf{Var}(X(t) - X(s)) \ = \ \texttt{Const} \cdot |t-s|^{\alpha}(1 + o(1)) \qquad \text{as} \quad t, s \to t^*\ ,$$

for some $\alpha \in (0, 2]$, where $t^* \in [0, T]$ is a point at which variance function of $X(\cdot)$ attains its maximum. This condition restricts the applicability of Pickands' theory to cases, for which the analyzed Gaussian process $X(\cdot)$ locally behaves as a fractional Brownian motion.

In the talk we analyze problem (1) for *locally self-similar* Gaussian processes $X(\cdot)$, for which variance function attains its maximum at point $t^* = 0$ and

$$\mathbf{Var}(X(t) - X(s)) \ = \ \texttt{Const} \cdot \mathbf{Var}\left(Y(t) - Y(s)\right)(1 + o(1)) \qquad \text{as} \quad t, s \to 0^+\ ,$$

where $\{Y(t) : t \geq 0\}$ is some centered, self-similar Gaussian process (with not necessarily stationary increments).

We will point out difficulties in application of classical approach of the double-sum method to our problem and we present a new approach, that allows us to determine the exact asymptotics (1). Additionaly, we analyze properties of counterparts of *Pickands' constants* that appear in the obtained asymptotics. The theory will be illustrated by some examples.

References

[1] Dębicki, K., Tabiś, K. (2011) Extremes of the time-average of stationary Gaussian processes. *Stochastic Processes and their Applications* **121**, 2049–2063.

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[3] J. Pickands III, (1969) *Upcrossing probabilities for stationary Gaussian processes*, *Trans. Amer. Math. Soc.* **145**, 51–73.

[4] V. I. Piterbarg, *Asymptotic methods in the theory of Gaussian processes and fields*, Translations of Mathematical Monographs 148, AMS, Providence, 1996.