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Investigation of solutions to higher-order dispersive equations with φ -sub-Gaussian initial conditions. (English) [Zbl 07450275](#)

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Summary: In this paper, there are studied sample paths properties of stochastic processes representing solutions of higher-order dispersive equations with random initial conditions given by φ -sub-Gaussian harmonizable processes. The main results are the bounds for the rate of growth of such stochastic processes considered over unbounded domains. The class of φ -sub-Gaussian processes with $\varphi(x) = |x|^\alpha$, $1 < \alpha \leq 2$ is a natural generalization of Gaussian processes. For such initial conditions the bounds for the distribution of supremum of solutions can be calculated in rather simple form. The bounds for the rate of growth of solution to higher-order partial differential equations with random initial conditions in the case of general φ were obtained in [Yu. Kozachenko et al., J. Stat. Phys. 172, No. 6, 1641–1662 (2018; [Zbl 1418.35325](#))], the derivation was based on the results stated in [Yu. Kozachenko and A. Slyvka-Tylyshchak, “On the increase rate of random fields from space $Sub_\varphi(\Omega)$ on unbounded domains”, Stat. Optim. Inf. Comput. 2, No. 2, 79–92 (2014; [doi:10.19139/soic.v2i2.45](#))]. Here we use another approach, which allows us, for the particular case $\varphi(x) = |x|^\alpha$, $1 < \alpha \leq 2$ to present the expressions for the bounds in the closed form.

MSC:

[60G12](#) General second-order stochastic processes

[35K58](#) Semilinear parabolic equations

[35R60](#) PDEs with randomness, stochastic partial differential equations

Keywords:

φ -sub-Gaussian process; higher-order dispersive equation; random initial condition; rate of growth

Full Text: [DOI](#)