2. Kauffman K.J. Description and analysis of metabolic connectivity and dynamics in the human red blood cell / K.J. Kauffman, J.D. Pajerowski, N. Jamshidi, B.O. Palsson, J.S. Edwards // Biophys. J.– 2002.–v.83.–P. 646–662.
3. Wiback S.J. Extreme pathway analysis of human red blood cell metabolism / S.J. Wiback, B.O. Palsson // Biophys. J.– 2002.–v.83.–P. 808–818.
4. Price N.D. Network-based analysis of metabolic regulation in the human red blood cell / N.D. Price, J.L. Reed, J.A. Papin, S.J. Wiback, B.O. Palsson // J. Theor. Biol.– 2003.–v. 225.–P. 185– 194.
5. Price N.D. Uniform sampling of steady-state flux spaces: means to design experiments and to interpret enzymopathies / N.D. Price, J. Schellenberger, B.O. Palsson // Biophys. J.– 2004.–v.87.–P. 2172–2186.
6. Nakayama Y. Dynamic simulation of red blood cell metabolism and its application to the analysis of a pathological condition / Y. Nakayama, A. Kinoshita, M. Tomita // Theor. Biol. Med. Model.– 2005.–v.2.–P. 18.

MATHEMATICAL SCIENCES

Marina Petranova
Vasyl' Stus Donetsk National University
Vinnytsia
Research Supervisor: Yu.V. Kozachenko,
Doctor of Science in Physics and Mathematics, Prof.

GAUSSIAN STATIONARY QUASI ORNSTEIN–UHLENBECK PROCESS AND ITS SIMULATION

Introduction. In the paper we apply representations of random processes in the form of random series with uncorrelated members, obtained in the work [2], for the construction of models of stochastic processes, which approximates the processes with given reliability and accuracy in spaces $C\left(\left[0,T\right]\right)$ and $L_p\left(\left[0,T\right]\right), p \geq 1$. Thus, *the objective of the paper* is to briefly discuss Gaussian stationary quasi Ornstein-Uhlenbeck process and its simulation.

We construct models that approximate the quasi Ornstein-Uhlenbeck process, which is a centered stationary Gaussian process with the correlation function $R(\tau) = \sigma^2 \cdot \exp\left\{-a\left|\tau\right|^2\right\}$, with given reliability $1-\alpha$, $0<\alpha<1$, and accuracy $\beta > 0$ in spaces $C\left(\left[0,T\right]\right)$ and $L_p\left(\left[0,T\right]\right), p \geq 1$.

Definition *A s*tationary random process $X = \{X(t), t \in \mathbb{R}\}$ is called a quasi Ornstein-Uhlenbeck process if $EX(t)=0$ and $E(X(t+h)\overline{X(s)}) = \sigma^2 \cdot \exp\{-ah^2\}$, where $\sigma^2>0$, $a>0$ are some constants.

Quasi Ornstein-Uhlenbeck processes are different from the Ornstein-Uhlenbeck processes, since they have smoother trajectories while they are used in the same fields of science and technology as the Ornstein-Uhlenbeck processes**.**

Theorem The model $X_N(t)$ approximates a separable Gaussian quasi Ornstein-Uhlenbeck random process $X(t)$ with a reliability $1-\alpha$, $0<\alpha<1$, and accuracy $\beta>0$ in the space $C(\mathrm{T})$, where $\mathrm{T}=[0,T]$, $T>0$, if $N>0$, $N \in \mathbb{N}$ are such that

$$Z_N(\beta) = 2e \cdot \frac{\beta^{2/\gamma}}{B_N^{2/\gamma}} \cdot \exp\left\{-\frac{\beta^2}{2B_N^2}\right\} \cdot \left(\left(\frac{TC_N}{2}\right)^{\gamma} \frac{\beta^{1-\gamma}}{1-\gamma} + B_N\right)^{1/\gamma} \le \alpha$$

$$B_N < \frac{\beta}{\sqrt{2}},$$

where B_N is determined by relation in [3], and $0<\gamma\le 1$.

References

1. Metric Characterization of Random Variables and Random Processes / V.V. Buldygin, Yu.V. Kozachenko. - RI: AMS; American Mathematical Society. — 2000. — 257 p.

2. Kozachenko Yu.V. On Expansion of Random Process in Series / Yu.V. Kozachenko, I.V. Rozora, Ye. Turchyn. // Random Operators and Stohastic Equations, 2007. – Vol. 15(1). – P. 15-35.

3. Petranova M. Simulation of Gaussian Stationary Quasi Ornstein–Uhlenbeck Process with Given Reliability and Accuracy in Spaces C([0,T]) and Lp([0,T]) / M. Petranova // Journal of Applied Mathematics and Statistics. – Columbia International Publishing, 2016. – Vol. 3, Iss. 1. – P. 44-58.