

**Platonova M. V., Tsykin S. V.** (Saint Petersburg, Russia) — **On probabilistic approximations of the Cauchy problem solution for higher order Schrödinger equations.**

We consider the Cauchy problem for the higher order Schrödinger equation

$$i \frac{\partial u}{\partial t} = \frac{(-1)^m}{(2m)!} \frac{\partial^{2m} u}{\partial x^{2m}}, \quad u(0, x) = \varphi(x), \quad (1)$$

where  $m \in \mathbf{N}$ . Probabilistic approximations of the Cauchy problem solutions for the Schrödinger equation ( $m = 1$ ) and for evolution equations with fractional derivatives by expectations of functionals of stochastic processes were constructed in [1] and [2].

We extend this approach to the case when  $m \geq 2$ . We construct two types of approximations of the Cauchy problem solution by expectations of stochastic processes functionals. In the first case we use processes defined by stochastic integrals over the Poisson point field with a specific intensity, in the second case we use a consequence of compound Poisson processes constructed by normed sums of i.i.d. random variables with finite moments of the order  $2m + 2$ .

#### REFERENCES

1. *Ibragimov I.A., Smorodina N.V., Faddeev M.M.* On a limit theorem related to probabilistic representation of the Cauchy problem solution for the Schrödinger equation. *J. Math. Sci.*, 2018, vol. 229:6, pp. 702–713.
2. *Platonova M.V., Tsykin S.V.* Probabilistic approach to Cauchy problem solution for the Schrödinger equation with a fractional derivative of order  $\alpha \in \bigcup_{m=3}^{\infty} (m-1, m)$ . *Zap. Nauchn. Sem. POMI*, 2018, vol. 474, pp. 199–212.