S.I. Abdrakhmanov (UUST, Ufa, Russia). **Nonlinear Schrödinger Equations with Perturbations**

Let a random process $V(t)$, $V(0) = 0$, $t \in [0, T]$, with almost surely continuous trajectories be given. We study the Cauchy problem for the equation
$i(u(\mathbf{x}, t) - \varphi(\mathbf{x})) + \int_0^t [\Delta u(\mathbf{x}, s) + f(|u(\mathbf{x}, s)|)u(\mathbf{x}, s)]\, ds + \int_0^t u(\mathbf{x}, s) * dV(s) = 0$ (1)
with initial condition $u(\mathbf{x}, 0) = \varphi(\mathbf{x}) \in C^2(\mathbf{R}^d)$, $d \in \mathbf{N}$. The last integral is the symmetric integral [1] with respect to the process $V(t)$. The following result holds for problem (1):

Theorem. *Suppose the function* $\Psi = \Psi(\mathbf{x}, t) \in C^{2,1}(\mathbf{R}^d \times [0, T])$ *satisfies the Cauchy problem* $i\Psi_t + \Delta\Psi + f(|\Psi|)\Psi = 0$, $\Psi(\mathbf{x}, 0) = \varphi(\mathbf{x})$. *Then the function* $u(\mathbf{x}, t) = \tilde{u}(\mathbf{x}, t, V(t)) = \Psi(\mathbf{x}, t) \exp\{iV(t)\}$, $\tilde{u}(\mathbf{x}, t, v) \in C^{2,1,1}(\mathbf{R}^d \times [0, T] \times \mathbf{R})$, *is a solution to the Cauchy problem (1).*

A similar method for constructing a solution is obtained for the nonlinear Schrödinger equation (NLSE) with a perturbation in an additional source. A numerical method for solving the NLSE with multiplicative noise in the nonlinear term is proposed. New exact solutions and numerical simulation results are presented.

СПИСОК ЛИТЕРАТУРЫ

[1] *Nasyrov F.S.* Local times, symmetric integrals and stochastic analysis, – M.:FIZMATLIT, 2011.