■ **Irina Melnikova**
Ural Federal University, Institute of Maths and Comp. Sciences, Russia, email: Irina.Melnikova@usu.ru,

Distribution Spaces Related to Abstract Stochastic Problems

The stochastic Cauchy problem for the first order equation

$$X'(t) = AX(t) + B\mathbb{W}(t),\ t \geq 0, \quad X(0) = \xi,$$

with a white noise process $\{\mathbb{W}(t)\}$ and generators of regularized semigroups (integrated, R-semigroups) in Hilbert space H is investigated in abstract (H-valued) distribution spaces. Weak solutions for the problem in the Ito form and generalized solutions for the "differential" problem in spaces of abstract Schwartz distribution (in time variable) and in spaces of abstract stochastic distributions (in random variable) are constructed in dependence on properties of the generator A and types of white noise.

New results are relations between these solutions. Somewhat unexpected was the fact that the first two types of solutions coincided for the equation with Q-white noise and initial values $\xi \in H$, while the modern technique of white noise analysis allowed to construct a solution in spaces of abstract stochastic distributions for equations with singular white noise, but for $\xi \in dom\, A$.

A special attention is given to investigations of equations generated by different type systems in the Gelfand-Shilov classification.

Keywords: distribution, semigroup of operators, white noise, Wiener process, generalized solution, weak solution, regularized solution.

[1] Melnikova I. V. and Anufrieva U. A. *Peculiarities and regularization of ill–posed Cauchy problems with differential operators*, J. of Math. Sciences, vol. 148(4), 481-632 (2008).

[2] M. A. Alshanskiy M. A. and Melnikova I. V. *Regularized and generalized solutions of infinite-dimensional stochastic problems*, Math. Sbornik, **11**, 3-30 (2011).