Zadorozhniy V. G. (Voronezh, Russia) **About the expectation of solution a linear system of differential equations with three random coefficients.**

Cauchy problem considered

$$\frac{dx}{dt} = \varepsilon_1(t)Ax + \varepsilon_2(t)x + \varepsilon_3(t)f(t), \tag{1}$$

$$x(t_0) = x_0. \tag{2}$$

Here $t \in \mathbb{R}, T = [t_0, t_1], x : \mathbb{R} \to \mathbb{R}^n$ is the desired vector function, $\varepsilon_1, \varepsilon_2$ is the Laplace random processes posed of characteristic functionals [1, стр. 30].

$$\varphi_j(u) = \frac{exp(i\int_T \xi_j(s)u(s)ds)}{1 + \int_T\int_T b_j(s_1,s_2)u(s_1)u(s_2)ds_1ds_2}, j = 1, 2,$$

ε_3 is random processes, A is matrix of size $n \times n$, $f : T \to \mathbb{R}^n$ is given vector function, x_0 is random vector. Here $\xi_j(s) = M(\varepsilon_j(s))$ is the expectation of a random process $\varepsilon_j, b_j(s_1, s_2) = M(\varepsilon_j(s_1)\varepsilon_j(s_2)) - M(\varepsilon_j(s_1))M(\varepsilon_j(s_2))$ is the covariance function of a random process $\varepsilon_j, i = (-1)^{0,5}, u : T \to \mathbb{R}$ is a summable on T function.

Theorem. If the conditions are met

$$\|A\|^2\int_T\int_T b_1(s_1,s_2)ds_1ds_2 < 1, \int_T\int_T b_2(s_1,s_2)ds_1ds_2 < 1,$$

$\varepsilon_1, \varepsilon_2, \varepsilon_3, x_0$ is independent und the functions ξ_j, b_j, f continuous on T, then

$$M(x(t)) =$$

$$= \exp(A\int_{t_0}^t \xi_1(s)ds)\sum_{k=0}^{\infty} A^{2k}(\int_{t_0}^t\int_{t_0}^t b_1(s_1,s_2)ds_1ds_2)^k \frac{\exp(\int_{t_0}^t \xi_2(s)dsM(x_0))}{1 - \int_{t_0}^t\int_{t_0}^t b_2(s_1,s_2)ds_1ds_2} +$$

$$+ \int_{t_0}^t exp(A\int_s^t \xi_1(\tau)d\tau)\sum_{k=0}^{\infty} A^{2k}(\int_s^t\int_s^t b_1(s_1,s_2)ds_1ds_2)^k \times$$

$$\times \frac{\exp(\int_s^t \xi_2(\tau)d\tau)}{1 - \int_s^t\int_s^t b_2(s_1,s_2)ds_1ds_2} M(\varepsilon_3(s))f(s)ds$$

is the expectation of solution of problem (1), (2).

Note that the case when $T = [0, \infty)$. The system (1) is asymptotically stable on average [2] if

$$\|\exp(A\int_{t_0}^t \xi_1(s)ds)\sum_{k=0}^{\infty} A^{2k}(\int_{t_0}^t\int_{t_0}^t b_1(s_1,s_2)ds_1ds_2)^k\| \frac{\exp(\int_{t_0}^t \xi_2(s)ds)}{1 - \int_{t_0}^t\int_{t_0}^t b_2(s_1,s_2)ds_1ds_2} \to 0$$

with $t \to \infty$.

СПИСОК ЛИТЕРАТУРЫ

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