$$+\int_0^t (X_{11}^*(t-\tau)B_1 + X_{12}^*(t-\tau)B_2)u(\tau)d\tau,$$

$$x_2(t) = X_{21}^*(t+0)x_{10} + \int_0^h X_{22}^*(t-\tau)A_{22}\psi(\tau-h)d\tau + Z_2^*[T_t]A_{22}\psi(t-T_t h-h) +$$

$$+\int_0^t (X_{21}^*(t-\tau)B_1 + X_{22}^*(t-\tau)B_2)u(\tau)d\tau + \sum_{k=0}^{T_t} Z_2^*[k]B_2u(t-kh), \quad (13)$$

where $T_t = [\frac{t}{h}]$ is the integer part of $\frac{t}{h}$ that can be given in the universal form as Variation-of-Constants Formula (generalized *Couchy formula*):

$$x_i(t) = X_{i1}^*(t+0)x_{10} + \int_0^h X_{i2}^*(t-\tau)A_{22}\psi(\tau-h)d\tau + Z_i^*[T_t]A_{22}\psi(t-T_t h-h) +$$

$$+\int_0^t (X_{i1}^*(t-\tau)B_1 + X_{i2}^*(t-\tau)B_2)u(\tau)d\tau + \sum_{k=0}^{T_t} Z_i^*[k]B_2u(kh),$$

$$t > 0,\ i = 1, 2. \quad (14)$$

Using the formula (14), we obtain effective parametric criteria for stability, reachability and observability of the considered DAD system.

ON AN EQUATION IN DYNAMICS OF ECOLOGICAL PROCESSES WITH DELAY

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The use of functional-differential equations while modeling the population dynamics processes has begun apparently with V. Volterra's papers. At first differential equations with one concentrated delay were considered. Then there appeared papers on several delays, with variable, integro-differential equations. Lately, partial equations with delay argument are considered.

In the paper we consider mathematical model of dynamics described by partial differential equation with one constant delay

$$u_t(x,t) = a_1^2 u_{xx}(x,t) + a_2^2 u_{xx}(x,t-\tau) +$$

$$+b_1u_x(x,t)+b_2u_x(x,t-\tau)+c_1u(x,t)+c_2u(x,t-\tau)+f(x,t),$$

defined for $t \geq 0$ in the interval $0 \leq x \leq l$. It is assumed that the coefficients at derivatives are proportional, more exactly, there exists a constant α such that $b_1 = \alpha a_1^2, \quad b_2 = \alpha a_2^2$. The first boundary value problem is considered. The initial condition has the form

$$u(x,t)=\varphi(x,t),\ \ 0\leq x\leq l,\ \ -\tau\leq t\leq 0,$$

the boundary conditions has the form

$$u(0,t)=\mu_1(t), u(l,t)=\mu_2(t), t\geq -\tau,$$

and the conditions of "agreement of boundary and initial conditions" is fulfilled:

$$u(x,t)=\sum_{n=1}^{\infty}\left\{e^{L_n(t+\tau)}\exp_\tau\left\{D_n,t\right\}\Phi_n(-\tau)+\right.$$

$$\left.+\int\limits_{-\tau}^{0}e^{L_n(t-s)}\exp_\tau\left\{D_n,t-\tau-s\right\}\left[\Phi_n'(s)-L_n\Phi_n(s)\right]ds\right\}e^{-\frac{1}{2}\alpha x}\sin\frac{\pi n}{l}x+$$

$$+\sum_{n=1}^{\infty}\left[\int\limits_{0}^{t}e^{L_n(t-s)}\exp_\tau\left\{D_n,t-\tau-s\right\}F_n(s)ds\right]e^{-\frac{1}{2}\alpha x}\sin\frac{\pi n}{l}x+$$

$$+\mu_1(t)+\tfrac{x}{l}\left[\mu_2(t)-\mu_1(t)\right],$$

$$\Phi_n(t)=\frac{2}{l}\int\limits_{0}^{l}\left\{\varphi(\xi,t)-\left[\mu_1(t)+\frac{\xi}{l}\left[\mu_2(t)-\mu_1(t)\right]\right]\right\}e^{-\frac{1}{2}\alpha\xi}\sin\frac{\pi n}{l}\xi d\xi,$$

$$F_n\left(t\right)=\frac{2}{l}\int\limits_{0}^{l}F(\xi,t)e^{-\frac{1}{2}\alpha x}\sin\frac{\pi n}{l}\xi d\xi,$$

$$F(x,t)=f(x,t)-\frac{d}{dt}\left\{\mu_1(t)+\frac{x}{l}\left[\mu_2(t)-\mu_1(t)\right]\right\}+\frac{b_1}{l}\left[\mu_2(t)-\mu_1(t)\right]+$$

$$+\frac{b_2}{l}\left[\mu_2(t-\tau)-\mu_1(t-\tau)\right]+c_1\left\{\mu_1(t)+\frac{x}{l}\left[\mu_2(t)-\mu_1(t)\right]\right\}+$$

$$+c_2\left\{\mu_1(t-\tau)+\frac{x}{l}\left[\mu_2(t-\tau)-\mu_1(t-\tau)\right]\right\}.$$