Meeting: 999, Nashville, Tennessee, SS 12A, Special Session on Biomathematics

999-34-183 **Iryna Uleychuk*** (mathacadem-Kiev@ukr.net), Ukr,76006,Ivano-Francovsk,st.:24 Serpny,30, 76006 Ivano-Frankovsk, Ukraine. *The solution differential systems with delay and with commutative matrixes*

$$\dot{x}(t) = Ax(t) + B(t-\tau) \qquad (1)$$

$x(t) \in R^n$, $t \geq 0$, $\tau = const.$
DEFINITION 1. Delay exponentional of matrix B is matrix function e_τ^{Bt} that has a form

$$e_\tau^{Bt} = \begin{cases} \theta, & \text{at} - infty < t < -\tau; \\ I, & \text{at} - \tau \leq t < 0; \\ I + B\frac{t}{1!} + B^2\frac{(t-\tau)^2}{2!} + \ldots + B^k\frac{(t-(k-1)\tau)^k}{k!}, & \text{at}(k-1)\tau \leq t < k\tau. \end{cases}$$

$k = 0, 1, 2, \ldots$, where θ is zero matrix.
THEOREM 1.Let $AB = BA$ of the system (1) is true.Then the solution Cauchy problem for system (1)has a form $x(t) = e^{A(t-\tau)}e_\tau^{B_1(t-\tau)}\varphi(-\tau) + \int_{-\tau}^0 e^{A(t-\tau-s)}e_\tau^{B_1(t-\tau-s)}e^{A\tau}[\varphi^/(s) - A\varphi(s)]ds$

$$\dot{x}(t) = Ax(t) + B(t-\tau) + f(t) \qquad (2)$$

THEOREM 3.The solution $\bar{x}(t)$ of nonhomogeneous system (2)with zero initial conditions has form $\bar{x}(t) = \int_0^t e^{A(t-\tau-s)}e_\tau^{B_1(t-\tau-s)}f(s)ds$,$t \geq 0$.

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