Theorems of Continuous Dependence of Solution on the Initial Data for One Class Neutral Functional Differential Equation with the Two Types Controls

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In the work is considered the following quasi-linear neutral functional differential equation

$$\dot{x}(t)=A(t,x(t),x(t-\theta),v(t))\dot{x}(t-\sigma)+f(t,x(t),x(t-\tau),u(t)),\quad t\in[t_0,t_1]$$

with the initial condition

$$x(t)=\varphi(t),\ \dot{x}(t)=g(t),\ t<t_0,\quad x(t_0)=x_0,$$

where $v(t)$ is a piecewise-continuous control function and $u(t)$ is a measurable control function. The theorems about continuity of solution on the initial data are proved. Under the initial data we mean the collection of delay parameters θ, σ and τ initial functions $\varphi(t)$ and $g(t)$ initial vector x_0 control functions $v(t)$ and $u(t)$. Such type theorems play an important role in studying optimization problems and in proving formulas variation of solution. A similar problem was studied early for a quasi-linear neutral functional differential equation without controls and perturbations of σ, in that case when $A(t, x(t), x(t-\tau), v(t)) \equiv A(t)$.

This work was supported by Shota Rustaveli National Science Foundation of Georgia (SRNSFG), Grant No. YS-21-554.