# On the Well-Posedness of the Cauchy Problem for One Class of Neutral Functional Differential Equation with Distributed Prehistory

*Tamaz Tadumadze*

e-mail: tamaz.tadumadze@tsu.ge
Department of Mathematics, Iv. Javakhishvili Tbilisi State University, 13 University St., 0186 Tbilisi, Georgia

The functional differential equation is considered

$$\dot{x}(t) = A(t)\dot{x}(t-\sigma) + \int_{t-\theta_0}^{t} f(t, x(t), x(s))ds, t \in [t_{00}, t_{10}] \qquad (1)$$

with the initial condition

$$x(t) = \varphi_0(t), \; \dot{x}(t) = h_0(t), \, t < t_{00}, \, x(t_{00}) = x_{00} \qquad (2)$$

and with distributed prehistory on the interval $[t-\theta_0, t], t \in [t_{00}, t_{10}]$, where $\sigma > 0, \, \theta_0 > 0$ are fixed numbers. A theorem on the continuous dependence of solution of the problem (1),(2) is proved with respect to perturbations of the initial data $(t_{00}, \theta_0, x_0, \varphi_0(t), h_0(t))$ and the integrand $f$ of the right hand side of equation. Perturbation of the initial data is small in the standard norm and perturbation of the integrand is small in the integral sense. Such type theorems are used in proving of the variation formulas and necessary optimality conditions [1, 2] .

## References

[1] G. L. Kharatishvili, T. A. Tadumadze, Variation formulas of solutions and optimal control problems for differential equations with retarded argument. *J. Math. Sci. ( NY)* , **104**, 1(2007), 1-175 .

[2] T. Tadumadze, N. Gorgodze, Variation formulas of a solution and initial data optimization problems for quasi-linear neutral functional differential equations with discontinuous initial condition. *Memoirs on Differential Equations and Mathematical Physics* , **63** (2014), 1-77.