Sufficient Conditions for the Existence of Optimal Controls for Some Classes of Functional-Differential Equations

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Abstract: Sufficient conditions for the existence of optimal controls for system of functional-differential equations which is nonlinear by phase variables and linear by control function are given. These conditions are obtained in terms of right-hand sides of the system and the quality criterion function, which makes them convenient for verification. The main differences from the previously obtained results are that the control is in the system as a functional, and the optimal control problem is considered until the exit of the solution from the area of a certain functional space.

Keywords: *optimal control, functional, weakly convergence, convexity, minimizing sequence.*

1 Introduction

Let $h > 0$ be a value of delay, $|\cdot|$ denote the norm of the vector in the space $\mathbb{R}^d$, $\|\cdot\|$ be the norm of $d \times m$ -dimensional matrix which is consistent with the norm of the vector.

Let us denote by $C = C\left([-h,0];\mathbb{R}^d\right)$ the Banach space of continuous maps of $[-h,0]$ into $\mathbb{R}^d$ with the uniform norm $\|\varphi\|_C = \max\limits_{\theta \in [-h;0]} |\varphi(\theta)|$. Also denote by $L_p = L_p\left([-h,0];\mathbb{R}^m\right)$, $p > 1$, the Banach space of p-integrable m-dimensional vector-functions with standard norm $\|\varphi\|_{L_p} = \left(\int_{-h}^0 |\varphi(\tau)|^p d\tau\right)^{\frac{1}{p}}$.

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