NECESSARY CONDITION OF THE OPTIMALITY OF THE SINGULAR CONTROLS IN MULTIPOINT LOAD CARRYING SYSTEM

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In this paper is considered problem of multipoint functional

$$S(u) = \varphi(x(\xi_1), x(\xi_2),..., x(\xi_m)) \tag{1}$$

at restrictions

$$u(t) \in U \subset R^r,\ t \in T = [t_0, t_1], \tag{2}$$

$$\dot{x}(t) = f(t, x(t), x(\xi_1), x(\xi_2),..., x(\xi_m), u(t)),\ \ t \in [t_0, t_1], \tag{3}$$

$$\sum_{j=1}^{m} B_j x(\xi_j) = l. \tag{4}$$

Here $\varphi(x_1, x_2,..., x_m)$ is given twice continuously differentiable scalar function, $f(t, x, x_1, x_2,..., x_m, u)$ is given *n*-dimensional vector-function which is continuous by all variables with its all partial derivatives at till the second order inclusive, B_j, $j = \overline{1,m}$ are given matrixes, $\xi_j \in [t_0, t_1]$, $j = \overline{1,m}$ are given points, l is given vector, $u(t)$ is *r*-dimensional piecewise continuous vector of control actions, U is given nonempty bounded set.

Problem (1)-(4) was studied in [1] by F.S.Ahmedov. For that problem at first was proved necessary condition of optimality in the form of principle of the maximum of Pontryagin, after that was deduced necessary condition of optimality of singular control by assistance of elementary needle-shaped variation of control.

As is generally known (see for example [3, 4]) at deducing of necessary condition of singular controls using of series of series needle-shaped variation allows to obtain stronger results. On the assumption of that in this study was obtained one multipoint necessary condition of optimality of singular controls summarizing analogous result.

References

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