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# OPTIMAL CONTROL FOR RETARDED CONTROL SYSTEM

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## 1. Introduction

In this paper we deal with the control problem for retarded functional differential equation:

(1.1)
$$\frac{d}{dt}x(t) = A_0x(t) + A_1x(t-h) + \int_{-h}^{0} a(s)A_2x(t+s)ds + B_0u(t),$$

(1.2)
$$x(0) = g^0, \quad x(s) = g^1(s), \quad s \in [-h, 0)$$

in the Hilbert space $H$. After we consider the regularity of solution of the retarded system, we proceed to necessary optimality condition of the optimal solution for given cost function $J$ in set of a admissible controls that is a closed and convex.

As for the regularity of solution we reduce the results of G. Blasio, K. Kunlsch and A. Sinestrari [2] regarding term by term. There exists a many literatures which studies optimal control problems of control systems in Banach spaces. However, most studies have been devoted to the systems without delay and the papers treating the retarded system with unbounded operators are not so many([cf. see [3.8] in case where with bounded operators).

In section 2, we consider some basic results on existence, uniqueness, and a representation formular functional differential equations in Hilbert spaces. We establish a form of a mild solution which is

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