Estimations of Solutions Convergence of Hybrid Systems Consisting of Linear Equations with Delay

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Received: February 16, 2006; Revised: February 26, 2007

Abstract: The logic-dynamical hybrid system given by a set of subsystems which are linear differential-difference equations with constant coefficients and constant delay is investigated in the paper. The estimations of disturbances of such system are obtained. We consider the cases of stable and unstable subsystems. Besides the estimations of solutions of hybrid system given by a set of scalar subsystems are obtained.

Keywords: Hybrid system; differential-difference equation; Lyapunov-Krasovsky functional; stable system

Mathematics Subject Classification (2000): 34K20, 34K06, 34O20

1 Introduction

Nowadays the disturbances in hybrid systems dynamic is an actual research problem [2,9]. Since in different branches such as medicine, ecology, construction of control systems, the state at a given moment in time essentially depends on the previous history, more adequate instrument for researching the dynamic of separate subsystems is formed by equations with delay [4-6].

Let the logic-dynamical system be given by a set of subsystems which are linear differential-difference equations with constant coefficients and constant delay

\[ \dot{x}(t) = A_i x(t) + B_i x(t - \tau), \quad i = 1, n, \quad x(t) \in \mathbb{R}^n, \quad t \geq 0. \]  

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