

Stability analysis of particular random switched linear dynamical system

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Interest in switched systems is based on their real-life applications. Engineering, natural and social systems cannot be simply described by a single model and in that cases systems exhibit switching between several models depending on various environments and applications. For example, switching has been extensively exploited in many engineering systems such as electronics, power systems, and traffic control.

The main reason of considering switch is that unpredictable, sudden change in the system dynamics or structures, such as a failure of a component or subsystem, or the accidental activation of any of the subsystems can occur. It is also introduced for effective control of highly complex non-linear systems of the so-called hybrid control. In both cases, an essential feature is the interaction between the continuous system dynamics and the discrete switching dynamics.

The main result of the work, given by simulations, confirms from a practical point of view the theoretical results [1],[2]. The examples of unstable and stable switched linear systems have been analysed and simulated with a help of the Matlab software - Simulink.

It was concluded that the stability of each linear system does not provide the stability of the corresponding switched linear system. Moreover, it was obtained that continuous-time switched linear system does not imply the stability in discrete-time.

- [1] Coppel, W.A. Stability and Asymptotic Behavior of Differential Equations.// Boston: D. C. Heath and Company , 1965.
- [2] Colaneri, Patrizio. Analysis and Control of Linear Swithed Systems.// Politecnico di Milano, 15 July 2018,