Lyapunov Functionals and Stability in Nonlinear Infinite Delay Volterra Discrete Systems

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Abstract

We employ Lyapunov functionals to the system with infinite delay Volterra Integro-differential equations of the form

$$x'(t) = Px(t) + \int_{-\infty}^{t} C(t,s)g(x(s))ds,$$

and obtain conditions for the stability of the zero solution. In addition, we will furnish an example as application. Due to the nature of the Lyapunov functional, we will be able to show that all solutions are $l\big(-\infty,\infty)\cap\mathbb{Z}\big)$.