

Lyapunov Functionals and Stability in Nonlinear Infinite Delay Volterra Discrete Systems

Abstract

In this research, we utilize Lyapunov functionals and obtain sufficient conditions for the stability of the zero solution of the discrete Volterra system of the form

$$x(t+1) = Px(t) + \sum_{s=-\infty}^{t-1} C(t,s)g(x(s)).$$

Due to the nature of the Lyapunov functional, we will be able to show that all solutions are $l([t_0, \infty) \cap \mathbb{Z})$.