A Discrete Retarded Gronwall-Bellman Type Inequality and its Applications to Difference Equations

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Abstract

In this paper we present a new discrete retarded Gronwall-Bellman type inequality. As applications, the dynamics of some delay difference equations are studied. First, the asymptotic behavior of solutions for scalar difference equation $\lambda(n)=a(n)x(n)+B(n,x_n)$ is discussed, and some new criterion on the asymptotic stability of the zero solution are obtained under weaker assumptions. Then the dissipativity of a nonautonomous delay difference system with superlinear nonlinearities is investigated. By using the inequalities established here, it is shown that the discrete set-valued process generated by the system possesses a unique global pullback attractor.

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