1991 MS Classification: 34, 39

Zhang, Shunian, Shanghai Jiaotong University, China:

Stability of neutral delay difference systems

Consider the neutral delay difference systems of the general form: $\Delta(D(n, x_n)) = f(n, x_n),\ n \in Z^+$, where Z^+ denotes the set of non-negative integers, $x \in R^k$ with some positive integer k, Δ is the forward difference operator, let $\mathcal{C} = \{\varphi : \{-r, -r+1, \ldots, -1, 0\} \to R^k\}$ with some $r \in Z^+$; define the norm of $\varphi \in \mathcal{C}$ as $\|\varphi\| = \max_{s=-r,-r+1,\ldots,0} |\varphi(s)|$ with $|\cdot|$ a norm in R^k, denote $\mathcal{C}_H = \{\varphi \in \mathcal{C} : \|\varphi\| < H\}$ for some constant $H > 0$, and $D, f : Z^+ \times \mathcal{C}_H \to R^k$, while $x_n \in \mathcal{C}$ is defined as $x_n(s) = x(n+s)$ for $s = -r, -r+1, \ldots, 0$. Two kinds of stability criteria are established in this work. One is by means of the discrete Liapunov functionals; while the other is with the discrete Liapunov functions. Both make use of Razumikhin techniques.

References: S. Elaydi, and S. Zhang, Stability and periodicity of difference equations with finite delay, *Funkcial. Ekvac.* , **37**(1994), 401-413; S. Zhang, Razumikhin techniques in delay difference systems, *PanAmerican Math. J.* **3** (1993), 1–16.