Matucci, Serena

The l^p trichotomy for difference systems and applications. (English) Zbl 1090.39501

Arch. Math., Brno 36, Suppl., 519-529 (2000).

The paper deals with a quasi-linear system

$$x(n+1) = A(n)x(n) + f(n, x(n)), \qquad n \in \mathbb{Z}, \tag{1}$$

where $A(n)$ in an $m \times m$ matrix and $f : \mathbb{Y} \times \mathbb{R}^m \to \mathbb{R}^m$ is a continuous function.

The aim is to study existence of bounded solutions of (1) having zero limit as $n \to \pm\infty$, under the assumption that solutions of the associated linear homogeneous system

$$x(n+1) = A(n)x(n), \qquad n \in \mathbb{Z}, \tag{2}$$

are not all bounded on $\mathbb{Z}$.

The main result discuss existence of at least one solution of the boundary value problem

$$\begin{gathered} y(n+1) = A(n)y(n) + f(n, y(n)) \\ y(-\infty) = y(+\infty) = 0 \\ y(0) = \xi \end{gathered}$$

under the assumption that the associated linear system (2) possesses an l^p trichotomy. The l^p trichotomy for a linear difference system is considered as an extension of exponential trichotomy and l^p dichotomy.

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MSC:

39A10 Additive difference equations
39A11 Stability of difference equations (MSC2000)
39A12 Discrete version of topics in analysis

Keywords:

nonlinear difference systems; asymptotic behavior of solutions; l^p trichotomy

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