Real Analysis Exchange
Summer Symposium XXXVIII, 2013, pp. ??–??

Jaqueline Godoy Mesquita, Universidade de São Paulo, Brazil. email: MISSING

ALMOST AUTOMORPHIC SOLUTIONS OF DYNAMIC EQUATIONS ON TIME SCALES

The theory of time scales is a recent theory which started to be developed by Stefan Hilger, on his doctoral thesis in order to unify the discrete and continuous cases. However, since time scale is a closed and nonempty subset of $\mathbb{R}$, this theory can unify several cases, depending on the chosen time scale.

In the present work, we introduce the concept of almost automorphic functions on time scales and present results about their properties. Then, we study the nonautonomous dynamic equations on time scales given by $x^{\Delta}(t) = A(t)x(t) + f(t)$ and $x^{\Delta}(t) = A(t)x(t) + g(t, x(t))$, $t \in \mathbb{T}$, where $\mathbb{T}$ is an invariant under translations time scale, $A \in \mathcal{R}(\mathbb{T}, \mathbb{R}^{n\times n})$, $f \in \mathcal{C}_{rd}(\mathbb{T}, \mathbb{R}^n)$ and $g \in \mathcal{C}_{rd}(\mathbb{T}\times\mathbb{R}^n, \mathbb{R}^n)$. We prove a result ensuring the existence of an almost automorphic solution for both equations, assuming that the associated homogeneous equation of this system admits an exponential dichotomy, $A(t)$ is almost automorphic and nonsingular matrix function, $A^{-1}(t)$ and $(I + \mu(t)A(t))^{-1}$ are bounded for every $t \in \mathbb{T}$, f is almost automorphic function and g is almost automorphic function with respect to first variable. Also, assuming the function g satisfies the global Lipschitz type condition, we prove the existence and uniqueness of an almost automorphic solution of the nonlinear dynamic equation on time scales. Further, we present some applications of our results for some new almost automorphic time scales. Finally, we present some interesting models which our main results can be applied.

Mathematical Reviews subject classification: Primary: ; Secondary:
Key words: ,