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Coauthors: Nickolai Kosmatov and Youssef N. Raffoul

IMPULSIVE DYNAMIC EQUATIONS ON A TIME SCALE

ERIC R. KAUFMANN

Let $\mathbb{T}$ be a time scale such that $0, t_i, T \in \mathbb{T}, i = 1, 2, \ldots, n$, and $0 < t_i < t_{i+1}$. Assume each t_i is dense. Using a fixed point theorem due to Krasnosel'skiĭ, we show that the impulsive dynamic equation

$$\begin{aligned} &y^{\Delta}(t) = -a(t)y^{\sigma}(t) + f(t, y(t)),\ t \in (0, T], \\ &y(0) = 0, \\ &y(t_i^+) = y(t_i^-) + I(t_i, y(t_i)), i = 1, 2, \ldots, n, \end{aligned}$$

where $y(t_i^{\pm}) = \lim_{t \to t_i^{\pm}} y(t)$, and y^{Δ} is the Δ-derivative on $\mathbb{T}$, has a solution. Under a slightly more stringent inequality we show that the solution is unique using the contraction mapping principle. Finally, with the aid of the contraction mapping principle we study the asymptotic stability of the zero solution on an unbounded time scale.

University of Arkansas at Little Rock
E-mail address: erkaufmann@ualr.edu