



Existence of Positive Solutions of a Nonlinear Third-Order M -Point Boundary Value Problem for p -Laplacian Dynamic Equations on Time Scales

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Abstract: In this paper, by using fixed-point theorems in cones, we study the existence of at least one, two and three positive solution of a nonlinear third-order m -point p -Laplacian boundary value problem on time scale.

Keywords: *time scales; nontrivial solution; fixed-point theorems.*

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1 Introduction

We study the third-order m -point boundary value problems (MPBVP) on time scales with p -Laplacian,

$$(\Phi_p(u^{\Delta\nabla}))^\nabla(t) + p(t)f(t, u(t)) = 0, \quad t \in [0, T]_{\mathbb{T}_k \cap T^k}, \quad (1)$$

$$u^{\Delta\nabla}(\rho(0)) = 0, \quad u^\Delta(T) = 0, \quad u(\rho(0)) = B\left(\sum_1^{m-2} \alpha_i u^\Delta(\xi_i)\right), \quad (2)$$

where Φ_p is p -Laplacian operator, i.e. $\Phi_p(s) = |s|^{p-2}s$, $p > 1$ and $(\Phi_p)^{-1} = \Phi_q$ with $\frac{1}{p} + \frac{1}{q} = 1$. Here $\rho(0) < \xi_1 < \xi_2 < \dots < \xi_{m-2} < \sigma(T)$.

(H1) $\alpha_i \in [0, \infty)$, $i = 1, 2, 3, \dots$ and $f : [0, T] \times [0, \infty) \rightarrow [0, \infty)$ is left-dense continuous function,

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