



Existence of Solutions for m -Point Boundary Value Problem with p -Laplacian on Time Scales

Ozlem Batit Ozen and Ilkay Yaslan Karaca*

Department of Mathematics Ege University, 35100 Bornova, Izmir, Turkey

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Abstract: We consider the existence of positive solutions for a class of second-order m -point boundary value problem with p -Laplacian on time scales. By using Avery-Peterson's fixed point theorem, sufficient conditions for the positive solutions are established. Meanwhile an example is worked out to illustrate the main result.

Keywords: m -point boundary value problems; p -Laplacian operator; positive solutions; fixed point theorems; time scales.

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1 Introduction

Calculus on time scales was introduced by Hilger (see [6]), as a theory which is undergoing rapid development as it provides a unifying structure for the study of differential equations in the continuous case and the study of difference equations in the discrete case. Some preliminary definitions and theorems on time scales can be found in books [3, 4] which are excellent references for calculus of time scales. Also, there is much attention paid to the study of multipoint boundary value problem (see [1, 2, 7–13]).

In [5] the following m -point boundary value problem on time scales was studied

$$\begin{aligned} u^{\Delta\nabla}(t) + q(t)f(u(t)) &= 0, \quad t \in [0, T]_{\mathbb{T}}, \\ u^{\Delta}(0) &= \sum_{i=1}^{m-2} b_i u^{\Delta}(\xi_i), \quad u(T) = \sum_{i=1}^{m-2} a_i u(\xi_i), \end{aligned}$$

* Corresponding author: <mailto:ilkay.karaca@ege.edu.tr>