On Solutions of a Nonlinear Boundary Value Problem on Time Scales

Aydin Huseynov

Institute of Mathematics and Mechanics, Azerbaijan National Academy of Sciences
AZ1141 Baku, Azerbaijan

Received: April 1, 2008; Revised: December 19, 2008

Abstract: We study a boundary value problem (BVP) for second order nonlinear dynamic equations on time scales. A condition is established that ensures existence and uniqueness of solutions to the BVP under consideration.

Keywords: time scale; delta and nabla derivatives; eigenvalue; fixed point theorem.

Mathematics Subject Classification (2000): 34B15.

1 Introduction

Let \( T \) be a time scale and \( a, b \in T \) be fixed points with \( a < b \) such that the time scale interval

\[
(a, b) = \{ t \in T : a < t < b \}
\]

is not empty. Throughout, all the intervals are time scale intervals. For standard notions and notations related to time scales calculus see [1, 2].

In this paper, we deal with the nonlinear boundary value problem (BVP)

\[
y^{\Delta \nabla}(t) + f(t, y(t)) = 0, \quad t \in (a, b),
\]

\[
y(a) = y(b) = 0.
\]

A function \( y : [a, b] \to \mathbb{R} \) is called a solution of the BVP (1), (2) if the following conditions are satisfied:

* Corresponding author: huseynov@email.com

© 2009 InforMath Publishing Group/1562-8353 (print)/1813-7385 (online)/www.e-ndst.kiev.ua 69