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OSCILLATION CRITERIA FOR A FOURTH ORDER SUBLINEAR DYNAMIC EQUATION ON TIME SCALE *

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Abstract

Some new criteria for the oscillation of a fourth order sublinear and/or linear dynamic equation on time scale are established. Our results are new for the corresponding fourth order differential equations as well as difference equations.

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1 Introduction

In this paper, we are concerned with the oscillatory behavior of the following fourth order sublinear and/or linear dynamic equation

$$x^{\Delta_4}(t) + q(t)x^{\lambda}(t) = 0 \tag{1}$$

on an arbitrary time scale $\mathcal{T} \subseteq \mathcal{R}$ with $\sup \mathcal{T} = \infty$, where $q : \mathcal{T} \to (0, \infty)$ is an rd-continuous function and λ is the ratio of positive odd integers.

A solution to equation (1) is said to be nonoscillatory if there exists a $t_0 \in \mathcal{T}$ such that $x(t)x(\sigma(t)) > 0$ for all $t \in [t_0, \dot{\infty}) \cap \mathcal{T}$, otherwise, it is said to be oscillatory. Equation (1) is said to be oscillatory if all its solutions are oscillatory.

Recently, there has been an increasing interest in studying the oscillatory behavior of the first and second orders dynamic equations on time-scales see [1-7]. With respect to dynamic equations on time scales, it is a new topic and for more basic ideas and background, we refer to [1-2].

We note that there are no results on the oscillation of equation (1). Therefore, our main goal is to establish some new criteria for the oscillation of equation (1). Our results are new even for the cases when $\mathcal{T} = \mathcal{R}$ and $\mathcal{T} = \mathcal{Z}$.

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