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OSCILLATION CRITERIA FOR A CERTAIN CLASS OF SECOND-ORDER NEUTRAL DELAY DYNAMIC EQUATIONS

S. H. Saker[1]

Department of Mathematics Skills, PY,
King Saud University, Riyadh 11451, Saudi Arabia
Corresponding author email: mathcoo@py.ksu.edu.sa

Abstract. By employing the generalized Riccati transformation technique, we will establish some new oscillation criteria for a certain class of second-order nonlinear neutral delay dynamic equations on a time scale $\mathbb{T}$. As a special case when $\mathbb{T}=\mathbb{R}$, our results involve the oscillation results established by Li and Liu [Canad. J. Math. 48 (1996), 871-886] and improve some well known oscillation results for second-order neutral delay differential equations. When $\mathbb{T}=\mathbb{N}$, our results involve the results established by Li and Yeh [Comp. Math. Appl. 36 (1998), 123-132] and improve some well known oscillation results for second-order neutral delay difference equations. When $\mathbb{T}=h\mathbb{N}$, $\mathbb{T}=\{t:t=q^k, k\in\mathbb{N}, q>1\}$, $\mathbb{T}=\mathbb{N}^2=\{t^2:t\in\mathbb{N}\}$ and $\mathbb{T}=\mathbb{T}_n=\{H_n:n\in\mathbb{N}_0\}$ where H_n be the so-called harmonic numbers our results are essentially new. Some examples illustrating our main results are given.

Keywords. *Oscillation, neutral delay dynamic equation, generalized Riccati technique, time scales.*

AMS (MOS) subject classification: 34B10, 39A10, 34K11, 34C10.

1 Introduction

The theory of time scales, which has recently received a lot of attention, was introduced by Stefan Hilger in 1988 in his Ph. D. Thesis in order to unify continuous and discrete analysis (see [19]). The theory of "dynamic equations" unifies the theories of differential equations and difference equations and it also extends these classical cases to cases " in between", e.g., to the so-called $q-$difference equations.

A time scale $\mathbb{T}$ is an arbitrary closed subset of the reals, and the cases when this time scale is equal to the reals or to the integers represent the classical theories of differential and of difference equations. Many other interesting time scales exist, and they give rise to many applications (see [4]). Since

[1]On leave from Department of Mathematics, Faculty of Science, Mansoura University, Mansoura, 35516, Egypt. Shsaker@mans.edu.eg