



Oscillation of Second Order Nonlinear Differential Equations with Several Sub-Linear Neutral Terms

J. Dzurina^{1*}, E. Thandapani², B. Baculikova¹, C. Dharuman³ and N. Prabakaran³

¹ Department of Mathematics, Faculty of Electrical Engineering and Informatics, Technical University of Košice, Letná 9, 042 00 Košice, Slovakia

² Ramanujan Institute for Advanced Study in Mathematics, University of Madras, Chennai - 600 005, India

³ Department of Mathematics, SRM University, Ramapuram Campus, Chennai - 600 089, India

Received: June 26, 2018; Revised: February 28, 2019

Abstract: Some new sufficient conditions for oscillation of all solutions of a class of second order differential equations with several sub-linear neutral terms are given. Our results generalize and extend those reported in the literature. Examples are included to illustrate the importance of the results obtained.

Keywords: second order neutral differential equation; sub-linear neutral term; oscillation.

Mathematics Subject Classification (2010): 34C10, 34K11.

1 Introduction

In this paper, we study the oscillatory behavior of second order differential equations with several sub-linear neutral terms of the form

$$(a(t)z'(t))' + q(t)x^\beta(\sigma(t)) = 0, \quad t \geq t_0 > 0, \quad (1)$$

where $m > 0$ is an integer, $z(t) = x(t) + \sum_{i=1}^m p_i(t)x^{\alpha_i}(\tau_i(t))$ and we assume that

(H_1) $0 \leq \alpha_i \leq 1$ for $i = 1, 2, \dots, m$ and β are the ratios of odd positive integers;

* Corresponding author: <mailto:jozef.dzurina@tuke.sk>