

## OSCILLATION OF SECOND ORDER EMDEN-FOWLER TYPE NEUTRAL DIFFERENCE EQUATIONS

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**Abstract.** Some new oscillation criteria for the second order Emden-Fowler type neutral difference equation

$$\Delta(a_n \Delta(x_n + p_n x_{n-k})) + q_n x_{\sigma(n)}^\alpha = 0, \quad n \geq n_0$$

where  $k$  is a positive integer,  $\alpha$  is a ratio of odd positive integers and  $\sigma(n) \leq n$  are established under the condition  $\sum_{n=n_0}^{\infty} \frac{1}{a_n} < \infty$ . Examples are provided to illustrate the results.

**Keywords.** Oscillation, Second order Emden-Fowler neutral difference equation.

**AMS (MOS) subject classification:** 39A10,39A12.

## 1 Introduction

In this paper we study the oscillatory behavior of the second order Emden-Fowler type neutral difference equation

$$\Delta(a_n \Delta(x_n + p_n x_{n-k})) + q_n x_{\sigma(n)}^\alpha = 0, \quad (1.1)$$

where  $n \in \mathbb{N}(n_0) = \{n_0, n_0 + 1, \dots\}$ ,  $n_0$  is a nonnegative integer,  $k$  is a positive integer,  $\alpha$  is a ratio of odd positive integers,  $\{a_n\}$ ,  $\{p_n\}$ ,  $\{q_n\}$  are real sequences and  $\{\sigma_n\}$  is a sequence of integers. We assume that the following conditions hold:

(c<sub>1</sub>)  $\{a_n\}$  is a positive real sequence with  $\sum_{n=n_0}^{\infty} \frac{1}{a_n} < \infty$ ;

(c<sub>2</sub>)  $\{p_n\}$  is a nondecreasing real sequence with  $0 \leq p_n < 1$ ;

(c<sub>3</sub>)  $\{q_n\}$  is a nonnegative real sequence and not identically zero for many values of  $n$ ;

(c<sub>4</sub>)  $\{\sigma_n\}$  is a sequence of integers such that  $\sigma(n) \leq n$ ,  $\Delta\sigma(n) > 0$  and  $\lim_{n \rightarrow \infty} \sigma(n) = \infty$ .