

# Oscillatory Mixed Differential Difference Equations

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**Abstract:** In this work is studied the oscillatory behavior of the delay differential difference equation of mixed type

$$x'(t) = \sum_{i=1}^{\ell} p_i x(t - r_i) + \sum_{j=1}^m q_j x(t + \tau_j) \quad (r_i > 0, i = 1, \dots, \ell; \tau_j > 0, j = 1, \dots, m)$$

Some criteria are obtained in order to guarantee that all solutions of (1) are oscillatory.

## 1 Introduction

The aim of this work is to study the oscillatory behavior of the differential difference equation of mixed type

$$x'(t) = \sum_{i=1}^{\ell} p_i x(t - r_i) + \sum_{j=1}^m q_j x(t + \tau_j) \quad (1)$$

where  $x(t) \in \mathbb{R}$ ,  $0 < r_1 < r_2 < \dots < r_\ell$ ,  $0 < \tau_1 < \tau_2 < \dots < \tau_m$  and the coefficients  $p_i, q_j$  are real numbers.

As usual, we will say that a solution  $x(t)$  of (??) oscillates if it has arbitrary large zeros. When all solutions oscillate (??) will be said oscillatory.