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Oscillation and nonoscillation criteria for half-linear second order differential equations

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ABSTRACT. We investigate oscillatory properties of the second order half-linear differential equation

$$(r(t)\Phi(y'))' + c(t)\Phi(y) = 0, \qquad \Phi(s) := |s|^{p-2}s, \qquad p > 1, \tag{$*$}$$

viewed as a perturbation of a nonoscillatory equation of the same form

$$(r(t)\Phi(y'))' + \tilde{c}(t)\Phi(y) = 0.$$

Conditions on the difference $c(t) - \tilde{c}(t)$ are given which guarantee that equation $(*)$ becomes oscillatory (remains nonoscillatory).

1. Introduction

In this paper we investigate oscillatory properties of the half-linear second order differential equation

$$(r(t)\Phi(y'))' + c(t)\Phi(y) = 0, \qquad \Phi(s) := |s|^{p-2}s, \tag{1}$$

where $p > 1$, $t \in I := [T, \infty)$, r, c are real-valued continuous functions and $r(t) > 0$ in I. Oscillation theory of half-linear equations (1) attracted a considerable attention in the recent years, see e.g. [1, 2, 4, 7, 15, 16, 18, 19, 21, 25] and the reference given therein. In these papers it was shown that many of the (non)oscillation criteria for the linear Sturm-Liouville second order differential equation

$$(r(t)y')' + c(t)y = 0 \tag{2}$$

(which is a special case $p = 2$ of (1)) extend to half-linear equation (1).

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