Oscillatory conditions of the nonlinear second order differential equation

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Abstract: In this study, we consider the nonlinear second order differential equation

$$(\rho(t)|y'(t)|^{p-2}y'(t))' + \vartheta(t)|y(t)|^{p-2}y(t) = 0, \quad t > 0 \qquad (1)$$

Let $I = (0,\infty)$, $1 < \rho < \infty$ and $\rho(\cdot)$ be positive continuous function.
The function $y : I \to R$ is called a solution of the equation (1), if $y(t)$ and $\rho(t)|y'(t)|^{p-2}y'(t)$ are continuously differentiable functions, and it satisfies the equation (1) for all $t > 0$.
For $p = 2$, the equation (1) becomes the Sturm-Liouville linear equation

$$(\rho(t)y'(t))' + \vartheta(t)y(t) = 0, \qquad (2)$$

There are a lot of studies on the qualitative properties of equations (1), (2) such as conjugate, disconjugate in a given interval and the oscillatory, nonoscillation of equations (1) and (2) for $t = \infty$. For nonnegative , these properties of the equations (1) and (2), were studied in [1].
In this paper, we investigate the questions of conjugacy, oscillatory of the equations (1) and (2) for the function which sign changes.
Keywords: conjugate, disconjugate, oscillatory, nonoscillation, conjugate points.

References:
[1] O. Dosly, P. Rehak, Half–linear differential equations, Math. Studies, North-Holland, 2005.