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OSCILLATION THEOREMS FOR CERTAIN EVEN ORDER NONLINEAR DAMPED DIFFERENTIAL EQUATIONS

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ABSTRACT. In this paper, we are concerned with a class of nonlinear damped differential equations of even order. By using the generalized Riccati technique and the integral averaging technique, new oscillation criteria are obtained for every solution of the equations to be oscillatory.

1. Introduction. This paper deals with a class of damped differential equations of even order in the form

$$\begin{aligned}(1.1)\quad &\left(\left|x^{(n-1)}(t)\right|^{\alpha-2}x^{(n-1)}(t)\right)' + p(t)\left|x^{(n-1)}(t)\right|^{\alpha-2}x^{(n-1)}(t)\\ &+ F\Big(t, x(\tau_{01}(t)), \dots, x(\tau_{0m}(t)), \dots, x^{(n-1)}(\tau_{n-11}(t)), \dots,\\ &\qquad x^{(n-1)}(\tau_{n-1m}(t))\Big) = 0\end{aligned}$$

for $t \geq t_0$, where

(i) n is even and $m \in N$;

(ii) $\alpha > 1$ is a constant;

(iii) $F : [t_0, \infty) \times R^m \times R^n \to R$ is a continuous function;

(iv) $\tau_{ki} : [t_0, \infty) \to R$ is a continuous function and $\lim_{t\to\infty} \tau_{0i}(t) = \infty$, $k = 0, 1, \dots, n-1$, $i = 1, 2, \dots, m$;

(v) $p : [t_0, \infty) \to [0, \infty)$ is a continuous function and

$$\lim_{t\to\infty} \int_{\bar{t}}^{t} \left(\exp\left\{-\int_{\bar{t}}^{s} p(\mu)\, d\mu\right\}\right)^{1/(\alpha-1)} ds = \infty$$

for every $\bar{t} \geq t_0$.

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