

Kiguradze, I. T.

An oscillation criterion for a class of ordinary differential equations. (Russian) Zbl 0768.34018
Differ. Uravn. 28, No. 2, 207-219 (1992).

The paper deals with oscillatory and asymptotic behaviour of the nonlinear differential equation (*) $u^{(n)} + u^{(n-2)} = f(t, u, \dots, u^{(n-1)})$, $n \geq 3$, where the nonlinearity $f : [0, \infty) \times \mathbb{R}^n \times \mathbb{R}^n \rightarrow \mathbb{R}$ satisfies the sign condition $f(t, x_1, \dots, x_n)x_1 \leq 0$. As a corollary of the general results for (*), the following oscillation criterion concerning the Emdem-Fowler type equation (***) $u^{(n)} + u^{(n-2)} = p(t)|u|^\lambda \operatorname{sgn} u$, $\lambda \neq 1$, $p(t) < 0$, is obtained.

Theorem. Let n be even. Then the condition $\int^\infty t^{\sigma_n(\lambda)} p(t) dt = -\infty$, where $\sigma_n(\lambda) = (n-3)\lambda$ if $0 < \lambda < 1$ and $\sigma_n(\lambda) = (n-3)$, if $\lambda > 1$, is necessary and sufficient for all eventually nonvanishing solutions of (***) to be oscillatory.

This theorem and some other statements of the paper reveal the surprising fact that concerning oscillation properties, equation (*) behaves like the equation $u^{(n-2)} = p(t)u$ rather than like $u^{(n)} = p(t)u$.

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MSC:

34C10 Oscillation theory, zeros, disconjugacy and comparison theory for ordinary differential equations

Cited in **3** Reviews
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oscillatory and asymptotic behaviour; nonlinear differential equation; Emdem-Fowler type equation