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Solvability of some third-order boundary value problems with asymmetric unbounded nonlinearities. (English summary)

The authors prove the existence of a solution to the boundary value problems
\[ u''' = f(t, u, u', u''), \]
\[ u(a) = A, \]
\[ c_1 u'(a) - c_2 u''(a) = B, \]
\[ c_3 u'(b) - c_4 u''(b) = C, \]
where \( c_i > 0 \) for \( i = 1, \ldots, 4 \), or \( c_1 = c_3 = 0 \), and in both cases \( A, B \) and \( C \) are arbitrary real numbers. The continuous function \( f: [a, b] \times \mathbb{R}^3 \to \mathbb{R} \) is supposed to satisfy the one-sided Nagumo condition
\[ f(t, x, y, z) \leq \varphi(|z|), \]
where \( \varphi \) is a continuous function such that
\[ \int_{0}^{\infty} \frac{\xi}{\varphi(\xi)} d\xi = +\infty. \]

In addition, the authors assume the existence of lower and upper solutions \( \alpha, \beta \) such that \( \alpha' \leq \beta' \).
The novelty of this result is in the fact that the Nagumo condition is one-sided only.

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Note: This list reflects references listed in the original paper as accurately as possible with no attempt to correct errors.

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