
Quasilinearization and resonant boundary value problems

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Abstract

We consider boundary value problems in the form

$$(l_2x)(t) = \varphi(t, x, x'), \quad x(a) = A, \quad x(b) = B, \quad (1)$$

where $(l_2x)(t) := x'' + p(t)x' + q(t)x$ is a resonant linear differential expression (resonant means that the homogeneous problem $(l_2x)(t) = 0$, $x(a) = 0$, $x(b) = 0$ has a nontrivial solution). Our approach is based on quasilinearization idea (M. Dobkevich, F. Sadyrbaev, N. Sveikate, I. Yermachenko. On Types of Solutions of the Second Order Nonlinear Boundary Value Problems. Abstract and Applied Analysis, Volume 2014 (2014), Article ID 594931) which is employed to convert the problem into that with a nonresonant linear part.

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