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SOLUTION SETS FOR TWO-POINT NONLINEAR BOUNDARY VALUE PROBLEMS

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We consider quasi-linear differential equations of the type

$$(l_2x(t)) = \varphi(t, x, x'), \tag{1}$$

where $l_2x(t) := x'' + p(t)x' + q(t)x$ is a linear form with continuous coefficients and $\varphi(t, x, x')$ is continuous in all arguments and continuously differentiable in (x, x'). Assume that φ is bounded (in modulus) also. Equation (1) is considered together with the boundary conditions

$$x'(a) = A, \quad x(b) = B. \tag{2}$$

Problems of this type were studied recently in [1].

Consider also the auxiliary Cauchy problems of the form

$$(l_2x(t)) = \varphi(t, x, x'), \quad x'(a) = A, x(a) = \gamma. \tag{3}$$

It is well known that the problem (1), (2) has a $C^2([a, b])$-solution if the homogeneous problem

$$(l_2x(t)) = 0, \quad x'(a) = 0, x(b) = 0 \tag{4}$$

has only the trivial solution $x(t) \equiv 0$. Provided that there are two solutions $u(t)$ and $v(t)$ of the problem (1), (2) we study properties of a set of solutions

$$S(u, v) = \{x(t, \gamma) : x \text{ solves the problem } (1), \gamma \in [u(a), v(a)]\}. \tag{5}$$

For this we introduce *the type of a solution* and consider possible cases of interrelation of solutions in a set $S(u, v)$.

REFERENCES

[1] M. Dobkevich. On non-monotone approximation schemes for solutions of the second order differential equations. *Differential and Integral Equations*, **26** (9/10): 1169–1178, 2013.

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