

Andrzej Lasota, Marian Łuczynski

A Note on the Uniqueness of Two Point Boundary Value Problems II

1. The previous paper [2] dealt with the connections between the existence and the uniqueness of the solutions of the boundary value problem for the equation

$$(1) \quad x'' = f(t, x, x').$$

It has been assumed that the right-hand side of equation (1) satisfies the following *Condition C₁*:

1° $f(t, x, y)$ is continuous on $\Delta \times R \times R$, where Δ is an open interval and R is real line,

2° for every $a \in \Delta$ and $p, q \in R$ there exists exactly one solution of the initial problem $x(a) = p, x'(a) = q$ and it is defined on the whole Δ .

Simultaneously with equation (1) the condition

$$(2) \quad \begin{aligned} \alpha x(a) + \beta x'(a) &= p, \\ \gamma x(b) + \delta x'(b) &= q, \end{aligned}$$

where $\alpha, \beta, \gamma, \delta$ are fixed and $a, b \in \Delta, a \neq b$ has been taken into the consideration.

The important particular case of this problem is the two point boundary value problem

$$(3) \quad x(a) = p, \quad x(b) = q.$$

It should be remembered that problem (1), (2) with any fixed $\alpha, \beta, \gamma, \delta$ is said to be *globally unique* if for every $a, b \in \Delta, a \neq b$ and $p, q \in R$ there exists at most one solution of equation (1) defined on Δ satisfying (2). Problem (1), (2) with any fixed $\alpha, \beta, \gamma, \delta$ is said to be *globally solvable* if for every $a, b \in \Delta$,

