ON A TWO POINT BOUNDARY VALUE PROBLEMS FOR FIRST ORDER LINEAR DIFFERENTIAL EQUATIONS WITH DEVIATING ARGUMENT

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We will consider the problem on the existence and uniqueness of a solution of the equation

$$u'(t)=p(t)u(\tau(t)) + q(t) \qquad (1)$$

satisfying the boundary condition

$$\lambda u(a) + \mu u(b) = c, \qquad (2)$$

where $p, q : [a, b] \to R$ are Lebesgue integrable functions, $\tau : [a, b] \to [a, b]$ is a measurable function, $\lambda, \mu, c \in R$, and $|\lambda| + |\mu| \neq 0$.

Nonimprovable sufficient conditions guaranteeing unique solvability of the problem (1), (2) will be established. The special case of the equation (1), where the function τ maps the interval $[a, b]$ into some subinterval $[\tau_0, \tau_1] \subseteq [a, b]$, which can be degenerated to a point, will be studied in more detail.