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ON A CORRECT SOLVABILITY SEMIPERIODICAL BOUNDARY VALUE PROBLEM FOR LINEAR HYPERBOLIC EQUOTION

Symbat S. Kabdrakhova
Institute of Mathematics MES RK, Almaty, Kazakhstan,
e-mail:S_Kabdrachova@mail.ru

We consider on $\bar{\Omega} = [0,\omega] \times [0,T]$ semiperiodical boundary value problem for linear hyperbolic equation with two independet variables

$$\frac{\partial^2 u}{\partial t \partial x} = A(x,t)\frac{\partial u}{\partial x} + B(x,t)\frac{\partial u}{\partial t} + C(x,t)u + f(x,t), \qquad (1)$$

$$u(0,t) = \psi(t), \quad t \in [0,T], \qquad (2)$$

$$u(x,0) = u(x,T), \quad x \in [0,\omega], \qquad (3)$$

where $A(x,t)$, $B(x,t)$, $C(x,t)$, $f(x,t)$ are continuous functions on $\bar{\Omega}$, function $\psi(t)$ is continuous-differentiable on $[0,T]$ and satisfies condition $\psi(0) = \psi(T)$.

Let's $C(\overline{\Omega})$ is space of continuous function $u : \overline{\Omega} \to R$ on $\overline{\Omega}$ with norm $\|u\|_C = \max\limits_{\overline{\Omega}} |u(x,t)|$.

In this paper we are investigated correct solvability of the problem (1)-(3). Necessary and sufficient conditions of correct solvability of semiperiodical boundary value problem are received for linear hyperbolic equation with two independent variables in the term coefficient $A(x,t)$ and T.

Definition. *Boundary value problem (1)-(3) is called correct solvability, if for any $f(x,t) \in C(\overline{\Omega})$ and cotinuous- differentiable function $\psi(t)$ on $[0,T]$, it has unique solution $u(x,t)$ and is valid*

$$\max\big\{\|u\|_C, \|u_x\|_C, \|u_t\|_C\big\} \le K \max\big\{\max_{t\in[0,T]} |\psi|, \|f\|_C\big\},$$

where K is constant, not depending from $f(x,t), \psi(t)$.

Thorem. *Boundary value problem (1)-(3) is correct solvability if and only if, when for some $\delta > 0$ the following inequality holds $\big|\int_0^T A(x,\tau)d\tau\big| \ge \delta$ for any $x \in [0,\omega]$.*

Was built examples, showing importance of conditions of the theorem.