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MATHEMATICAL CONFERENCE**

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ABSTRACTS

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Abstracts of XI International V.Skorobohatko Mathematical Conference are published. The new results in a few branches of mathematics relevant to interests of Prof. Vitaliy Skorobohatko (1927-1996) are presented. Tasks in the fields of ordinary differential equations and differential equations with partial derivatives are considered, problems in function theory, functional analysis, algebra and computational mathematics are analyzed. A number of applications to problems in mathematical physics and mechanics are developed.

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First page: portrait of V.Skorobohatko

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THE FIRST BOUNDARY VALUE PROBLEM FOR
EQUATION $\frac{\partial u}{\partial t} - \Delta u = |u|^q \varrho^\gamma(x)$ IN THE CLASS OF
GENERALIZED FUNCTIONS

Let $n \in \mathbb{N}$, Ω is a bounded domain in \mathbb{R}^n with closed frontier S of class C^∞ , $Q = \Omega \times (0, T]$, $\Sigma = S \times (0, T]$, $0 < T < +\infty$;

$$\varrho(x, t) = \begin{cases} \varrho_1(x) & \text{at } d(x) \rightarrow 0, \\ \sqrt{\varrho_2(t)} & \text{at } t \rightarrow 0, \\ 1, & \text{inside of the domain } Q, \end{cases}$$

where $\varrho(x) \equiv \varrho_1(x)$, $x \in \overline{\Omega}$, is a infinitely differentiable nonnegative function, which is a positive function on Ω , has the order of the distance $d(x)$ from the point x to S near S and $\varrho_1(x) \leq 1$, $x \in \overline{\Omega}$;

$\varrho_2(t)$, $t \in (0, T]$, is a infinitely differentiable nonnegative function, which is a positive function at $t \in (0, T]$, has the order t when $t \rightarrow 0$ and $\varrho_2(t) \leq 1$, $t \in (0, T]$; $0 \leq \varrho(x, t) \leq 1$, $(x, t) \in \overline{Q}$.

Let $D(\overline{\Sigma}) = C^\infty(\overline{\Sigma})$, $D(\overline{\Omega}) = C^\infty(\overline{\Omega})$;

$$D^0(\overline{\Sigma}) = \{\varphi \in D(\overline{\Sigma}) : \frac{\partial^m \varphi}{\partial t^m} \Big|_{t=T} = 0, m = 0, 1, \dots\},$$

$$D_0(\overline{\Omega}) = \{\varphi \in D(\overline{\Omega}) : \varphi|_S = 0\}.$$

The strokes will denote the spaces of linear continuous functionals on the respective functional spaces.

We introduce a functional space

$$\mathcal{M}_k(Q) = \{v \in L^1_{loc}(Q) : \|v\|_k = \int_Q \varrho^k(x, t) |v(x, t)| dx dt < +\infty\}, k \in \mathbb{R}.$$

We study the problem

$$\frac{\partial u(x, t)}{\partial t} - \Delta u(x, t) = |u(x, t)|^q \varrho^\gamma(x), (x, t) \in Q,$$

$$u|_\Sigma = F_1(x, t), (x, t) \in \Sigma, \quad u|_{t=0} = F_2(x), x \in \Omega,$$

$$q \in (0, 1), \gamma \in (-1; 0), F_1 \in (D^0(\overline{\Sigma}))', F_2 \in (D_0(\overline{\Omega}))'.$$

Using the Schauder's method, there was obtained the sufficient conditions for solvability of this problem in the space $\mathcal{M}_k(Q)$.

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