PIDSTRYHACH INSTITUTE FOR APPLIED PROBLEMS OF MECHANICS AND MATHEMATICS OF NAS OF UKRAINE
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IVAN FRANKO LVIV NATIONAL UNIVERSITY
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WESTERN SCIENTIFIC CENTER OF NAS AND MES OF UKRAINE

XI INTERNATIONAL SKOROBOHATKO MATHEMATICAL CONFERENCE

(October 26 30, 2020, Lviv, Ukraine)

ABSTRACTS

Lviv – 2020

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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Approved for publication by the Academic Council of Pidstryhach Institute for Applied Problems of Mechanics and Mathematics, National Academy of Sciences, Ukraine (prot. 7, 1.10.2020)

First page: portrait of V.Skorobohatko

ISBN 978-966-02-9390-8 (electronic publication)

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for Applied Problems
of Mechanics and Mathematics

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THE FIRST BOUNDARY VALUE PROBLEM FOR EQUATION $\frac{\partial u}{\partial t} - \triangle u = |u|^q \varrho^\gamma(x)$ 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^∞, $Q = \Omega \times (0,T]$, $\Sigma = S \times (0,T]$, $0 < T < +\infty$;

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

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 $t \to 0$ and $\varrho_2(t) \leq 1$, $t \in (0,T]$; $0 \leq \varrho(x,t) \leq 1$, $(x,t) \in \overline{Q}$.

Let $D(\overline{\Sigma}) = C^\infty(\overline{\Sigma})$, $D(\overline{\Omega}) = C^\infty(\overline{\Omega})$;
$D^0(\overline{\Sigma}) = \{\varphi \in D(\overline{\Sigma}) : \ \frac{\partial^m}{\partial t^m}\varphi \,|_{t=T} = 0, \ m = 0,1,\ldots\}$,
$D_0(\overline{\Omega}) = \{\varphi \in D(\overline{\Omega}) : \varphi|_S = 0\}$.

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

We introduce a functional space
$\mathcal{M}_k(Q) = \{\mathrm{v} \in L^1_{loc}(Q) : ||\mathrm{v}||_k = \int\limits_Q \varrho^k(x,t)|\mathrm{v}(x,t)|\,dxdt < +\infty\}$, $k \in \mathbb{R}$.

We study the problem

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

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

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

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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