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NONLOCAL PROBLEM WITH INTEGRAL CONDITIONS FOR POLICALORIC EQUATION OF SECOND ORDER

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Let $H(R\times R)$ be a class of certain functions, $K_{L,M}$ be a class of quasi-polynomials in the form $f(t,x)=\sum_{i=1}^{n}\sum_{j=1}^{m}R_{ij}(t,x)\exp[\alpha_i x+\beta_j t]$, where $R_{ij}(t,x)$ are given polynomials, $\alpha_i\in M\subseteq C,\beta_j\in L\subseteq C$, for $\alpha_l\neq\alpha_k$ and $\beta_l\neq\beta_k$, for $l\neq k$, for $k\in N,l\in N$.

In the strip $\Omega=\{(t,x)\in R^2 : t\in(0,T),x\in R\}$ we consider equation

$$\left[\frac{\partial}{\partial t}-a\left(\frac{\partial}{\partial x}\right)\right]^2 U(t,x)=f(t,x), \tag{1}$$

satisfies nonlocal integral conditions

$$P_i\left(\frac{\partial}{\partial x}\right)\frac{\partial^k U(t,x)}{\partial t^k}\bigg|_{t=0}+Q_i\left(\frac{\partial}{\partial x}\right)\frac{\partial^k U(t,x)}{\partial t^k}\bigg|_{t=T}+\int_0^T t^k U(t,x)dt=0,. \tag{2}$$

for $k=0{,}1$ where $T>0$, $a_j\left(\frac{\partial}{\partial x}\right)$ are differential expressions, with analytical symbol $a(\lambda)\neq const$, $p_i\left(\frac{\partial}{\partial x}\right),q_i\left(\frac{\partial}{\partial x}\right)$ are given differential polynomials, with analytical functions $p_i(\lambda),q_i(\lambda)$. Solution of the problem (1), (2), according to the differential- symbol method [1] exists and unique in the class of quasi-polynomials, which is represented in the form

$$U(t,x)=f\left(\frac{\partial}{\partial \nu},\frac{\partial}{\partial\lambda}\right)\{G(t,\nu,\lambda)\exp[\lambda x]\}\Big|_{\nu=\lambda=0},$$

where $G(t,\nu,\lambda)$ is a solution of the problem

$$\left[\frac{d}{dt} - a(\lambda)\right] G(t, v, \lambda) = \exp[vt],$$

$$\int_0^T G(t, v, \lambda) dt = 0, \int_0^T tG(t, v, \lambda) dt = 0 ,$$

This result continues the research of work [2, 3].

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2. *Kalenyuk P. I. Nytrebych Z. M. Kohut I. V. Kuduk G.* Problem for nonhomogeneous second order evolution equation with homogeneous integral conditions // Math. Methods and Phys.-Mech. Fields. – 2015. – Vol. 58, No 1. – P. 7-19.
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НЕЛОКАЛЬНА ЗАДАЧА З ІНТЕГРАЛЬНИМИ УМОВАМИ ДЛЯ ПОЛІКАЛОРИЧНОГО РІВНЯННЯ ДРУГОГО ПОРЯДКУ

За допомогою диференціально-символьного методу побудовано розв’язок нелокальної задачі з інтегральними умовами для полікалоричного рівняння другого порядку в класі квазімногочленів, і доведено його єдиність.