# Integral problem for system of partial differential equations of second order

**G. Kuduk**

Faculty of Mathematics and Natural Sciences University of Rzeszow,Graduate of University, Rzeszow, Poland

*gkuduk@onet.eu*

Let $H(\mathbb{R}_+ \times \mathbb{R})$ be a class of entire functions on $\mathbb{R}$, $K_L$ is a class of quasipolynomials of the form $\varphi(x) = \sum\limits_{i=1}^{n} Q_i(x) \exp[\alpha_i x]$, where $\alpha_i \in L \subseteq \mathbb{C}$, , $\alpha_k \neq \alpha_l$, for $k \neq l$, $Q_i(x)$ are given polynomials.

Each quasipolynomial defines a differential operator $\varphi\left(\frac{\partial}{\partial\lambda}\right)$ of finite order on the class of entire function, in the form

$$\sum_{i=1}^{m} Q_i\left(\frac{\partial}{\partial\lambda}\right) \exp\left[\alpha_i \frac{\partial}{\partial\lambda}\right] \Big|_{\lambda=0}.$$

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

$$\frac{\partial^2 U_i}{\partial t^2} + \sum_{j=1}^{n} a_{ij}\left(\frac{\partial}{\partial x}\right)\frac{\partial U_j}{\partial t} + \sum_{j=1}^{n} b_{ij}\left(\frac{\partial}{\partial x}\right) U_j(t,x) = 0, \tag{1}$$

$$\int_0^T U_{ik}(t,x)dt = \varphi_{ik}(x), \quad k = 1,2, \tag{2}$$

$$\int_0^T tU_{ik}(t,x)dt = \varphi_{ik}(x). \quad i = 1,...,n. \tag{3}$$

where $a_{ij}\left(\frac{\partial}{\partial x}\right), b_{ij}\left(\frac{\partial}{\partial x}\right)$, are differential expression with entire symbols $a_{ij}(\lambda), b_{ij}(\lambda) \neq 0$.

Solution of the problem (1), (2), (3) according to the differential-symbol method [1] exists and unique in the class of quasi-polynomials.

1. Kalenyuk P. I., Nytrebych Z. M. Generalized Scheme of Separation of Variables. Differential-Symbol Method [in Ukrainian]. — Lviv: Publishing House of Lviv Polytechnic Natyonaly University, 2002, 292.
2. Kalenyuk P.I., Nytrebych Z.M., Kohut I.V., Kuduk G. Problem for nonhomogeneous evolution equation of second order with homogeneous integral conditions. Math. Methods and Phys.-Mech. Polia., 2015, 58, No. 2, 7–19.