A BOUNDARY VALUE PROBLEM FOR AN EQUATION OF MIXED ELLIPTIC-PARABOLIC TYPE WITH TWO INNER DEGENERATION LINES

Akbarova S.Kh.
Andizhan State University,
Department of Mathematics,
Andizhan, Uzbekistan.
marguba6511@umail.uz

This article explores a nonlocal boundary value problem in the domain for equation of mixed type

$$0=\begin{cases} y^{m_1}u_{xx}-|x|^{n_1}u_y, x>0, \\ (-y)^{m_2}u_{xx}+|x|^{n_2}u_{yy}, x<0, \end{cases} \tag{1}$$

where the domain Ω is limited by segments A_1A_0, A_0B_0, B_0A_2 of straights $x=h_1$, $y=Y$, $x=-h_1$ respectively at $y>0$ and at $y<0$ of smooth curves.

$$\sigma_i: \frac{1}{q_2^2}|x|^{2q_2}+\frac{1}{p_2^2}(-y)^{2p_2}=\frac{h_1^{2q_2}}{q_2^2}\ (i=1,2).$$

At this point $m_k, n_k = const(k=1,2)$, $h_1=(2q_1)^{1/q_1}$, $2q_i=n_i+2$, $2p_2=m_2+2$, $Y=c\quad o\ >n0,$ and at $i=1$ $x>0$, at $i=2$ $x<0$.

Problem. Find a function $u(x,y)$, with the following properties:

1) $u(x,y)\in C(\overline{\Omega})\cap C^1(\Omega)$;

2) $u(x,y)$ - is a regular solution of the equation (1) in domain Ω;

3) $u(x,y)$ satisfies the conditions

$$\left(\rho_i(s)A_s^{\pm}[u]+\delta_i(s)u\right)\Big|_{\sigma_i}=\psi_i(s),\ 0<s<l, \tag{2_i}$$

$$u(\pm h_1,y)+\sum_{j=1}^{n}\mu_{ij}(y)u(\alpha_{ij}(y),y)=\chi_i(y),\ 0\le y\le Y, \tag{3_i}$$

where $\psi_i(s)$, $\rho_i(s)$, $\delta_i(s)$, $\gamma_i(y)$, $\mu_{ij}(y)$, $\alpha_{ij}(y)$, $\chi_i(y)$ $(i=1,2)$ -given sufficiently smooth functions, s - length of the arc curve σ_i, measured from the point of $A_i(\pm h_1,0)$, while $A_s^{\pm}[\,]=(-y)^{m_2}\frac{dy}{ds}\frac{\partial}{\partial x}-(\pm x)^{n_2}\frac{dx}{ds}\frac{\partial}{\partial y}$ (at $i=1$ the upper sign is taken, and when $i=2$ -lower sign); $0\le n<\infty$.

Under certain restrictions on the given functions, it is proved the existence and uniqueness of solution of the given problem.

Acknowledgment. This work was supported by professor of National University of Uzbekistan named after M.Ulugbek- B.Islomov