ARALASH TENGLAMA UCHUN INTEGRAL ULASH SHARTLI CHEGARAVIY MASALA

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Ushbu ishda Riman-Liuvill kasr tartibli hosila ishtrok etgan aralash tenglama uchun aralash sohada Volterra integral operatorli ulash shartli chegaraviy masalaning yagona yechimi mavjudligi tadqiq qilinadi.

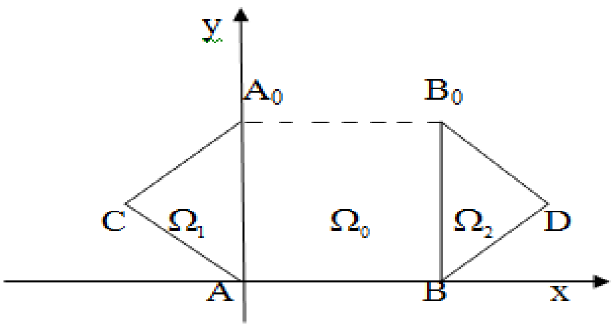
$$f(x,y)=\begin{cases} U_{xx}(x,y)-D_{0y}^{\alpha}U(x,y), & (x,y)\in\Omega_0 \\ U_{xx}(x,y)-U_{yy}(x,y), & (x,y)\in\Omega_i \quad (i=1,2) \end{cases} \qquad (1)$$

tenglamani $\Omega=\Omega_0\cup\Omega_1\cup\Omega_2\cup AA_0\cup BB_0$ aralash sohada tadqiq qilamiz.

Bu yerda $f(x,y)$-berilgan funksiya , $D_{0y}^{\alpha}U$ esa α kasr tartibli Riman-Liuvill integro-differsial operatori bo‘lib, u $0<\alpha<1$ uchun quydagicha aniqlangan $[1]$:

$$D_{0y}^{\alpha}g(t)=\frac{1}{\Gamma(1-\alpha)}\frac{d}{dt}\int_0^t (t-z)^{-\alpha}g(z)dz.$$

(1) tenglama uchun Ω sohada



1-rasm

quydagi masalani tadqiq etamiz:

1-Masala. (1) tenglamaning Ω sohada $U(x,y)\in C(\bar{\Omega})\cap AC^1(\Omega_0)\cap C^2(\Omega_i),\ U_{xx}\in C(\Omega_0)$

funksiyalar sinfiga tegishli quyidagi shartlarni qanoatlantiradigan regulyar yechimi topilsin:

$$U(x,0)=0, \qquad 0\le x\le 1,$$

$$U\big|_{A_0C}=\varphi(y), \qquad \frac{1}{2}\le y\le 1,$$

$$U\big|_{B_0D}=\psi(y), \qquad \frac{1}{2}\le y\le 1,$$

$$U_x(0+,y)=I_1(U(x,y)\big|_{x=0-}),\quad U_y(0+,y)=U_y(0-,y), \qquad 0<y<1,$$

$$U_x(1-0,y)=I_2(U_x(x,y)\big|_{x=1+0}),\quad U_y(1-0,y)=U_y(1+0,y), \qquad 0<y<1.$$

Bu yerda $\varphi(y)$, $\psi(y)$-berilgan funksiyalar, I_1, I_2 lar esa hozircha ixtiyoriy integral operatorlar.Bunday tipdagi masalalar I_1 *va* I_2 integral operatorlarning maxsus ko‘rinishida $[2]$ da ($\alpha=1$ holda) hamda $0<\alpha<1$ uchun $[3]$ tadqiq etilgan.

Tenglama parabolik tipga tegishli bo‘lgan sohada 2-chegaraviy masala, giperbolik tipga tegishli bo‘lgan sohalarda Koshi masalasi yechimidan foydalanib, tadqiq etilgan masala ekvivalent tarizda Volterra integral tenglamalar sistemasiga keltirilgan.

FOYDALANILGAN ADABIYOTLAR

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