BO'LAKLI O'ZGARMAS ARGUMENTLI DIFFERENSIAL TENGLAMANING YECHIMLARI HAQIDA

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Annotatsiya: Ushbu maqolada bo'lakli doimiy argumentli diffuziya teng-lamasi o'rganildi. Qaralayotgan differensial tenglamalarning yechimini mavjudlik shartlari va topish masalasi keltiriladi.

Kalit so'zlar: differentsial tenglama, bo'lakli doimiy argumentli, davriy yechim, metod, xususiy hosila, uzluksiz, Fur'e qatori.

Annotation: In this paper, the diffusion equation with a constant argument is studied. The conditions of existence and the problem of finding the solution of the differential equations under consideration are given.

Key words: differential equation, partial constant argument, periodic solution, method, special product, continuous, Fourier series.

Bo'lakli o'zgarmas argumentli differensial tenglamalar gibrid tizimli modellashtirish masalalarida, biologik tizimlarni o'rganishda paydo bo'ladi [1-4].

Bo'lakli o'zgarmas argumentli xususiy hosilali differensial tenglamalarga keluvchi amaliy masallar [5, 6] ishlarda keltirib o'tilgan.

Ushbu maqolada, biz bo'lakli konstanta argumentli differentsial tenglamaning N – davriy yechimini topish metodini keltiramiz

$$u_t'(x,t) = a^2 u_{xx}''(x,t) + bu(x,[t]), 0 < x < 1, t > 0, \quad (1)$$

$$u(0;t) = u(1;t) = 0, \quad (2)$$

$$u(x;0) = v(x) = 0, \quad (3)$$

bu yerda $v(x)$ funksiya $[0,1]$ intervalda uzluksiz.

(1-3) tenglama yechimining ta'rifini keltiramiz.

Ta'rif. *Agar* $u(x,t)$ *funksiya quyidagi shartlarni qanoatlantirsa, unga (1-3) masalaning yechimi deyiladi,:*

(i) $u(x,t)$ *funksiya* Ω *to'plamdaa uzluksiz,* $\Omega = [0,1] \times R_+, R_+ = [0, \infty)$;

(ii) u_t' *va* u''_{xx} *xususiy hosilalar* $(x;[t])\in\Omega$ *nuqtalardan tashqari* Ω *to'plamda mavjud va uzluksiz, hamda* $(x;[t])\in\Omega$ *nuqtalarda esa faqat bir tomonlama hosilalar mavjud;*

(iii) $u(x,t)$ *funksiya* $(x;[t])\in\Omega$ *nuqtalardan tashqari* Ω *da (1-3) tenglamalarni qanoatlantiradi.*

(1) tenglama yechimini quyidagi formal qator ko'rinishda izlaymiz:

$$u(x,t)=\Sigma_{j=1}^{\infty}T_j(t)\sin j\pi x. \qquad (4)$$

Bu yerda $T_j(t)$ funksiya ushbu

$$T_j'(t)+a^2\pi^2 j^2T_j(t)+bT_j([t])=0,\ t>0,\ \ j=1,2,\ldots. \qquad (5)$$

$$v_j=T_j(0) \qquad (6)$$

tenglamaning yechimi, v_j - $v(x)$ *funksiya Fur'ye* qatori koeffitsentlari

$$v(x)=\Sigma_{j=1}^{\infty}v_j\sin j\pi x, \qquad v_j=2\int_0^1 v(x)\sin j\pi x\,dx$$

Teorema 1. *Agar (5-6) tenglama yechimga ega bo'lsa, (1-3) masala yagona yechimga ega va u (4) ko'rinishda aniqlanadi.*

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