BIRINCHI TARTIBLI BA`ZI BO`LAKLI O`ZGARMAS ARGUMENTLI DIFFERENSIAL TENGLAMA UCHUN UMUMIY YECHIMNI TOPISH ALGORITMI

Raxmanova Charos Tursunboy qizi
Jizzax Davlat Pedagogika Universiteti 2-kurs magistranti

Annotatsiya. *Hozirgi zamon texnikasining tez rivojlanishi bo'lakli o'zgarmas argumentli birinchi tartibli differensial tenglamalarning yechimlari mavjudligi masalasini qo'yilishi va o'rganilishini talab qilmoqda. Bu mavzu matematika-fizika fani uchun nazariy va amaliy jihatdan katta ahamiyatga egadir.*

Shuning uchun ham bo'lakli o'zgarmas argumentli birinchi tartibli differensial tenglamalarning Koshi shartlarida yechimlari mavjudligi mavzusi dolzarb hisoblanadi.

**Kalit so`zlar:** *O`zgarmas argument, bo`lakli differensial tenglamada uzluksizlik, differensial tenglamada butun qism*

Hozirda tez-tez kuzatiladigan bõlak-bõlak doimiy õzgarishlar bilan boģliq kõplab hodisalar mavjud. Bõlak-bõlak doimiy tizimlar bu hodisalarni bõlak-bõlak doimiy argumentni ôz ichiga olgan tegishli differensial tenglamalar bilan modellashtirilishi mumkin. Ushbu nazariya 1-marta K.Kuk va boshqalar tomonidan õrganilgan. Ushbu differensial tenglamada doimiy argument ma'lum oraliqlarda doimiy bõlgan argumentlarni õz ichiga oladi(masalan, eng katta butun funksiya) Maqolada bo`laklangan doimiy bõlgan chiziqli bõlmagan impulsiv differensial tenglamaning tebranishlari kõrib chiqildi. Impulsiv chiziqli bõlmagan 1-tartibli differensial tenglamalar sinfi yechimlarining mavjudligi va õziga xosligiga e'tibor qaratdi va bõlak-bõlak doimiy argumentlarga ega tebranishlar uchun yetarli sharoitlarni tahlil qilinadi.

1-qadam. $x'(t) = x(t)g(x([t]))$, $t \in [0,\infty)$, $x(0) = c_0$ tenglamani $[0,1)$ oraliqda integrallaymiz:

$x(t) = c_0 e^{g(x(0))t}$, $x(0) = c_0$.

2-qadam. Uzluksiz xossasiga ko'ra

$$x(1) = \lim_{t\to 1-0} x(t) = c_0 e^{g(x(0))}$$

3-qadam. $x'(t) = x(t)g(x([t]))$, $t \in [0,\infty)$, $x(1) = c_1$ tenglamani $[1,2)$ oraliqda integrallaymiz:

$x(t) = c_1 e^{g(x(1))(t-1)}$, $x(1) = c_1$

4-qadam.

$$x(1) = \lim_{t\to 1-0} x(t) = c_0 e^{g(x(0))}$$

Tenglikdan foydalanib, $x(t) = c_0 e^{g(x(0))} e^{g(c_0 e^{g(x(0))})(t-1)}$, $[1,2)$ oraliqda.

5-qadam. Uzluksizlik xossasiga ko'ra

$x(2) = \lim_{t\to 2-0} x(t) = c_0 e^{g(x(0))} e^{g(c_0 e^{g(x(0))})}$, 6-qadam. $x'(t)=x(t)g(x([t]))$, $t\in[0,\infty)$, $x(k)=c_k$ tenglamani $[k,k+1)$ oraliqda $x(t)=c_k e^{g(x(k))(t-k)}$,

7-qadam. Uzluksizlik xossasiga ko'ra

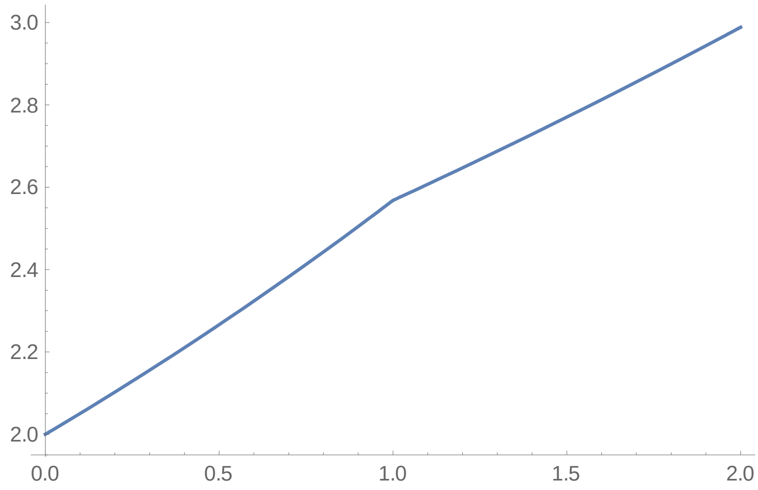
$$x(k)=\lim_{t\to k-0}x(t)=c_0e^{g(x(0))}e^{g(c_0e^{g(x(0))})}\ldots$$

Misol-3.1.

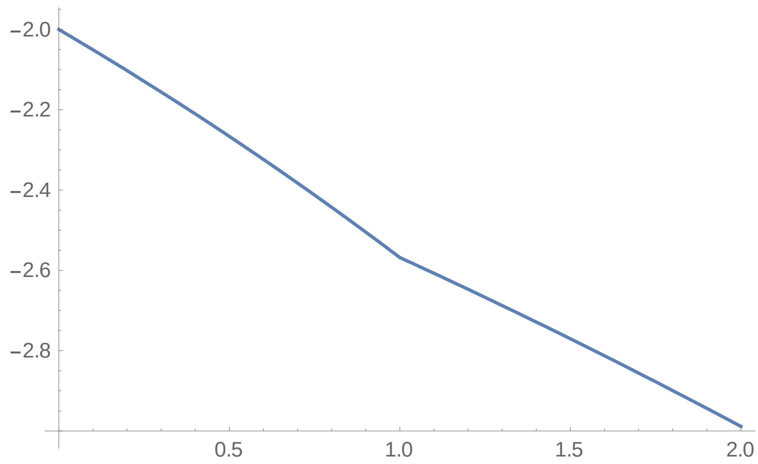
$x'(t)=x(t)g(x([t]))$, $t\in[0,\infty)$, $x(0)=c_0$ masalani [0,2) orliqda yechimini topamiz:

$$x(t)=\begin{cases}c_0e^{g(c_0)t}, & t\in[0,1),\\ c_0e^{g(c_0)}e^{g(c_0e^{g(c_0)})(t-1)}, & t\in[1,2).\end{cases}$$

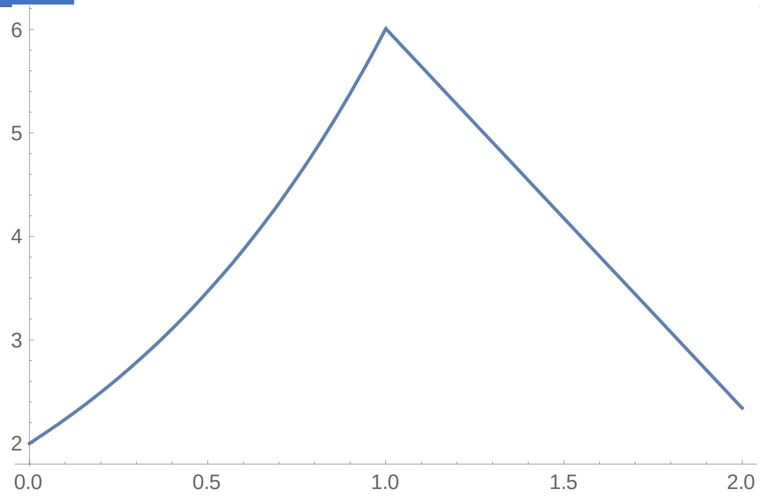
a) Agar $c_0=2$ va $g(t)=\frac{1}{t^2}$ bo'lsa,



b) Agar $c_0=-2$ va $g(t)=\frac{1}{t^2}$ bo'lsa,



c) Agar $c_0=2$ va $g(t)=\frac{1}{sint}$ bo'lsa,



FOYDALANILGAN ADABIYOTLAR RO'YXATI

[1] S. BUSENBERG, K. COOKE: *Vertically Transmitted Diseases*. Models and Dynamics,Biomathematics, Springer-Verlag, Berlin, **23**, 1993.

[2] GOUZ, T. SARI: *A class of piecewise linear differential equations arising in biological models*,Special issue: Non-smooth dynamical systems, theory and applications, Dyn. Syst. **17**(4)(2002), 299-316.

[3] J.K. HALE, V. LUNEL: *Introduction to Functional Differential Equations*. Springer, NewYork, 1993.

[4] T. KUPPER, R. YUANG: *On quasi-periodic solutions of differential equations with piecewise constant argument*, J. Math. Anal. Appl. **267** (2002), 173-193.

[5] Y. HINO, T. NAITO, N.V. MINH, J.S. SHIN: *Almost Periodic Solutions of Differential Equations in Banach Spaces*. Stability and Control: Theory, Method and Applications, Taylor & Francis, London, **15** 2002.

[6] A. CABADA, J.B. FERREIRO: *First order differential equations with piecewise constant arguments and nonlinear boundary value conditions*. J. Math. Anal. Appl. **380** (2011), 124-136.

7. www.edu.uz

8. www.ziyonet.uz