8-amaliy mashg`ulot

Mavzu: Chiziqli algebraic tenglamalar sistemalariga keltiriladigan modellashtirish masalalari

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Kerakli jihozlar. Matlab®/Simulink®dasturiy ta'minoti bilan ta'minlangan kompyuterlar va printerlar.

Polinomlarning ildizlarini aniqlash

Polinomlarning ildizlarini aniqlash uchun root(p) kamandasidan foydalanish mumkin (bu yerda p- polinomning koiffisentlari)

Misol: ***P(x) = +3.2 x^5 -5.2x^4+0.5 x^2+x -3*** polinomning hamma ildizlarini quyidagicha hisoblash mumkin:

```
>>p=[1 0 3.2 -5.2 0 0.5 1 -3];
%polimonning koiffisentlari
>> r=roots(p)
%ildizlarni
hisoblash r=
-0.5668 + 2.0698i
-0.5668 - 2.0698i
-0.6305 + 0.5534i
-0.6305 - 0.5534i
1.2149
0.5898 + 0.6435i
0.5898 - 0.6435i
>>polyval(p, 1.2149)
%polimonning qiymatini x=1.2149 da
tekshirish ans =
    0.0000
```

Funksiyaning nollarini aniqlash

Funksiyaning nollarini aniqlash fzero komandasidan foydalaniladi.

Misol: y =0.025x + sin x-1 funksiyaning nollarini [0; 10] kesmasida aniqlash 1- Funksiyani xosil qilish:

function f=fun1(x)
*f=0.25*x+sin(x)-1;* 2 - uni
fun1.m nom bilan saqlash 3 –
kamandalar oynasida ishlash:
>>fplot@fun1[0, 10] % fun1 funksiyaning grafigini kesmada qurish
>> grid on ;
>> x1=fzero@fun1,[0 1]
% funksiyaning [0 1] kesmadagi nollarini hisoblash
X1 =
0.8905
>> x2=fzero@fun1,[2 3]
% funksiyaning [0 1] kesmadagi nollarini hisoblash
X2 =
2.8500
>> x3=fzero@fun1,[1, 5, 0.001]
% funksiyaning [0 1] kesmadagi nollarini hisoblash
X3 =
5.8128

Tenglamalarni yechish

1-misol. $\sin(x^2 - 0.6) = 0$ tenglamani [0; 3]kesmada yeching.
1. Grafig usul:

>> x=0: 01:3;
% argumentning qiymati
>> f=sin(x ^ 2-0.6);
% funksiyaning qiymati
*>> plot(x,[f,0*f])*
% y=f va y=0 funkiyaning grafiglari
>> grid on ;
>> x1 = ginput
% nuqtaning koordinatalarini ekranga enteraktiv….
Chiqarish (sichqonchaning ko'rsatkichlarini kerakli nuqtaga olib kelinadi.. va u bosib turilgan holda<<Enter>> tugmasi bosiladi) *x1 =*
0.7746 -0.0012
%ikkinchi son y10 ga mos keladi
>>
g2=ginput
X2 =

1.9343 0.0023

>> x3=fzero(f,[2 3])
X3 =
2.6326
2. Analitek usul;
>> X = 0:,01:3;
%argumentning qiymatlari
>> n =length(x);
% x vectorning uzunligini xisoblash
>> ind=1 : n-1;
% indekslar vectori
>> f=sin(x.^2-0.6);
%funksiyaning qiymati
*>> ildizlar=x (f(ind). *f(ind+1)<=0)*
%funksiya qo`shni qiymatlarining ko'paytmasi manfiy bo'lgan nuqtalar tenglamalarning ildizlari bo'ladi va ular ildizlar vektoriga o'tadi .
Ildizlar=0.7746 1. 9300 2.6200 **2-misol.** *2x+y -5z +t= 8 x – 3y -6t = 9 2y – z + 2t = -5 x + 4y -7z + 6t= 0*
Tenglamalar sistemasini yeching.
Yechish.
>> A=[2 1-5 1;1-3 0 -6; 0 2 -1 2;1 4 -7 6];
%sistemaning matritsasi
>> B=[8;9;-5;0];
%o'ng tomonning ustun vektori
>> A1=[A,B];
%sistemaning kengaytirilgan matritsasi
>> if and(rank(A)==rank(A1),rank(A)==4)
%matritsa rangini tekshirish disp
('Sistema yagona yechimga
ega');
x=A\B;
% teskari slesh yoki chapdan bo'luv – chiziqli sistemani….
%Gauss usuli bilan
yechish x1=x'; End x1
x1=
3.0000 -4.0000 -1.000 1.0000
*>>x=A^(-1)*B; x2=x'*

%A\B yozuvning ikkinchi
varianti x2 =
3.0000 -4.0000 -1.0000 1.0000
*>>inv(A)*B; x3=x'*
%A\B yozuvning uchunchi
varianti x2 =
3.0000 -4.0000 -1.0000 1.0000

Berilgan sistemaning eng kichik kvadratlar usuli bilan yechish

>> A=[21 -5 1;1 -3 0 -6;0 2 -1 2;1 4 -7 6];
% sistemaning matrisa
>> B=[8;9;-5;0]
%o'ng tomonlarining ustun vektori
>> x=lsqr(A,B)
% chiziqli sistemani yechish uchun % biriktirilgan funksiya (eng kichik kvadratlar usuli)
x =
3.0000 -4.0000 -1.0000 1.0000
MATLAB 2014A da
>> A=[2 1 -5 1;1 -3 0 -6;0 2 -1 2;1 4 -7 6]; B=[8;9;-5;0];
x=lsqr(A,B) lsqr converged at iteration 4to a solution with
relative residual 1.
7
e
-
1
1
x
=
3.0000
-4.0000
-1.0000
1.0000

Tengsizliklar va tenglamalar sistemalarini yechish 1-misol

$$x - 2$$

$$2 < \frac{\quad}{x+3}$$

Tenglikni yeching
Yechish:
>>maple('solve','{(x-
2)/(x+3)>2}',x) ans =
{-8 < x , x< -3 }
Tengsizlikni
yechimi -8 < x <
< -3.

2-misol

$\frac{\quad}{\quad} \le 51$, $\sqrt{\sqrt{\quad}} - 1 < 10.69 \le 10x^2 + 4x$

Tengsizlik sistemasini yeching
Yechish:
>> maple('solve','{(x-2)/(x+3)<=51, sqr(x) *(sqrt(x)-1)
<10,10*x^2+4*x>=69}',x) ans =
{-1/5+1/10*694^(1/2)<= x, x < 21/2+1/2*41^(1/2)}
>>
vpa(ans,4)
ans =
{2.434 <= x, x < 13.70 }
Tengsizliklar sistemasida aniq yechimi
$$-\frac{\quad}{\quad}+ \le x, \quad x < \frac{\quad}{\quad}+.$$
Va taqribiy yechimi
$2{,}434 \le x < 13{,}70$

Sonli differensiallash va integrallash

Polinomning hosilasini hisoblashda polyder, funksiyaning hosilasini hisoblashda diff komandalaridan foydalanish mumkin.

1-misol. $P(x)=x^5 + x^3 + 1$ polinomning hosilasi.

```
>> P=[ 1 0 1 0 0 1 ];
% berilgan polinom koeffitsentlarining vektori
>> P1 (x) koeffitsentlarining vektori
P1 =
    5 0 3 0 0
```

Yani P’ (x) = $5x^4 + 3x^2$

2-misol. Y = sin(x) funksiya hosilasining taqribiy qiymatini hisoblash.

```
>> x=0:.05:10;
 % argumentlar vektori
>>y=sin(x);
%funksiya qiymatlarining vektori
>>d=diff(y);
% qo’shni elementlar ayirmalarining vektori: d=[y(2)-y(1),…,y(n)-y(n-1)]
>>pr=d/0.05;
% hosila qiymatlarining vektori
>>pr(5)
%hosila x=x(5)=0.2 dagi qiymati
 0.9747
 >>cos(x(5))
 % aniq qiymat bilan taqqoslash
 0.9801
```

Funksiyaning hosilasini hisoblash uchun trapetsiyalar va Simson usullariga mos keluvchi trapz va quad komandalaridan foydalaniladi.

· **3-misol.** *f* (e 2x - 1) dx integralni trapetsiyalar va Simpson usullari bilan hisoblash.

1 – trapetsiyalar usuli:

```
>> h=0.001;      x=0:h:1;
>> y=exp(2*x)-1;
>> int=trapz(y)*h
Int=
     2.1945
```

2 – Simpson usuli:

```
>>                int=quad(‘exp(2*x)-
1’,0,1,1.0e-5) Int = 2.1945
```

Talabalar mavzuni mukammal o’zlashtirishlari uchun bajaradigan topshiriqlar:

1. \+ + + 1 *ifodaning x bo’yicha differensalini toping?*
2. *Y=$3x^3+4x^2+8x-48$ ifodaning x bo’yicha differensalini toping?*
3. ∫ ∫ (+) *ifodadan ikki marta (avval x, keyin y bo`yicha) aniq integralni hisoblang?*

4. $\int\int((+) + 2)$ *ifodadan ikki marta (avval x, keyin y bo`yicha) aniq integralni hisoblang?*

5. *y1=sin(x); y2=$x^4/4+x^3/3+x^2/2+x+7$; y3=$3x^3$+sin(x); y4=sin(x)+cos(x); y5=e^{2x}+sin(x);[-10 15] funksiya grafigini bitta oynada hosil qiling?*

6. *z=$3x^3$+sin(x)-$(x+y)^2$; [-10 10] funksiyaning uch o`lchamli grafigini quring?*

7. *z=[-1+2i;-2-3i;2+3i;5+2i;2-5i;-8+4i] vector grafigini quring?*

8. $\int$ ∓ −+ + 4 + 9 *ifodadan ikki marta (avval x, keyin y bo`yicha) aniq integralni hisoblang? 9.* $x^3-1=0$ *tenlamani yeching?*

10.$3x^3+4x^2+8x-48=0$ *tenglamani yeching?*

Tekshirish uchun savollar:

1) Matematik modellashtirish;
2) Meshgrid funksiyasining vazifasini ayting; 3) Chiziqli algebra masalalarini keltiring?
4) Ezplot funksiyasining vazifasi nima?
5) Ikki va uch o’lchamli grafiklarni hosil qilish;
6) Dasturlash, m-fayllar va funksiyalar;
7) Dslove funksiyasining vazifasi nima?
8) Darajalar bo`yicha komplektlash funksiyasini ayting?

Oddiy differensial tenglamalar;