( )

[ ]

```
> restart:

  with(plots):
  #        V A L U E
  SetkaRavnomer:=proc(leftValue, rightValue, nValue)
            local i, shagValue, Value:
            #                      VALUE
            shagValue:=evalf((rightValue-leftValue)/nValue):
            Value[1]:=leftValue:
            for i from 2 to nValue do
                      Value[i] :=Value[i-1]+shagValue:
            end do:
            Value[nValue+1]:=rightValue;
            [seq(Value[k], k=1..nValue+1)]
  end proc:

  ExactMeshSolution:=proc(T, l, L, a2, b2, c2, c_x21, c_x22,
  Nx, Nt)
            local odeXdrob, solXdrob, solTdrob, generalsoldrob,
  show, subsolution, SetkaX:
            local SetkaT, initialData, q1, q2, leftBound,
  rightBound, q3, q4, j, i, NaSetkeFractDerivSol:
            #

            odeXdrob  := diff(A2*diff(m2(x), x),x)/m2(x) = C2:
            solXdrob := dsolve(odeXdrob, m2(x)):
            solTdrob := n2(t)=Sum(t^k/GAMMA(b2*(k+1)), k=0..infinity):
            generalsoldrob := subs(A2=a2, C2=c2, _C1=c_x21,
  _C2=c_x22, evalf(subs(solXdrob, solTdrob, n2(t)*m2(x)))):
            printf("
      (     )                                          ");
            show:=p2=solXdrob;
            print(show):
            subsolution := subs(Sum=add, infinity=12,
  generalsoldrob):
            p r i n t f ( "
      "                    );
            subsolution := evalf(subsolution):
            print(subsolution):

            #
            SetkaX := SetkaRavnomer(l, L, Nx):
            SetkaT := SetkaRavnomer(0, T, Nt):

            for j from 1 to Nt+1 do:
                      for i from 1 to Nx+1 do:
                                NaSetkeFractDerivSol[j, i] :=
```

```
    evalf(subs(t=SetkaT[j], x=SetkaX[i], subsolution)):
                          od:
              od:
              [NaSetkeFractDerivSol, subsolution]:
    end proc:
```

```
> #
  T := 1: #   ,        < 1
  l := 0.01: #
  L := 1: #
  #
  Nx := 1000: #  - 1
  Nt := 10: #   - 1
  SetkaX:= SetkaRavnomer(l, L, Nx):
  SetkaT:=SetkaRavnomer(0, T, Nt):

  #
  a2 := 0.5: #
  b2 := 0.5: #
  #
  c2 := 5: #
  c_x21  := -0.01: #
  c_x22 := 10: #
  #            2          2

  ForHelp := ExactMeshSolution(T, l, L, a2, b2, c2, c_x21,
  c_x22, Nx, Nt):
  NaSetkeFractDerivSol := evalf(ForHelp[1]):
  PartSolution := 'PartSolution':
  PartSolution := ForHelp[2]:
  PartSolution;

  #
  #
  InitialData := subs(t=0, PartSolution):
  #
  LeftBound := subs(x=l, PartSolution):
  RightBound := subs(x=L, PartSolution):

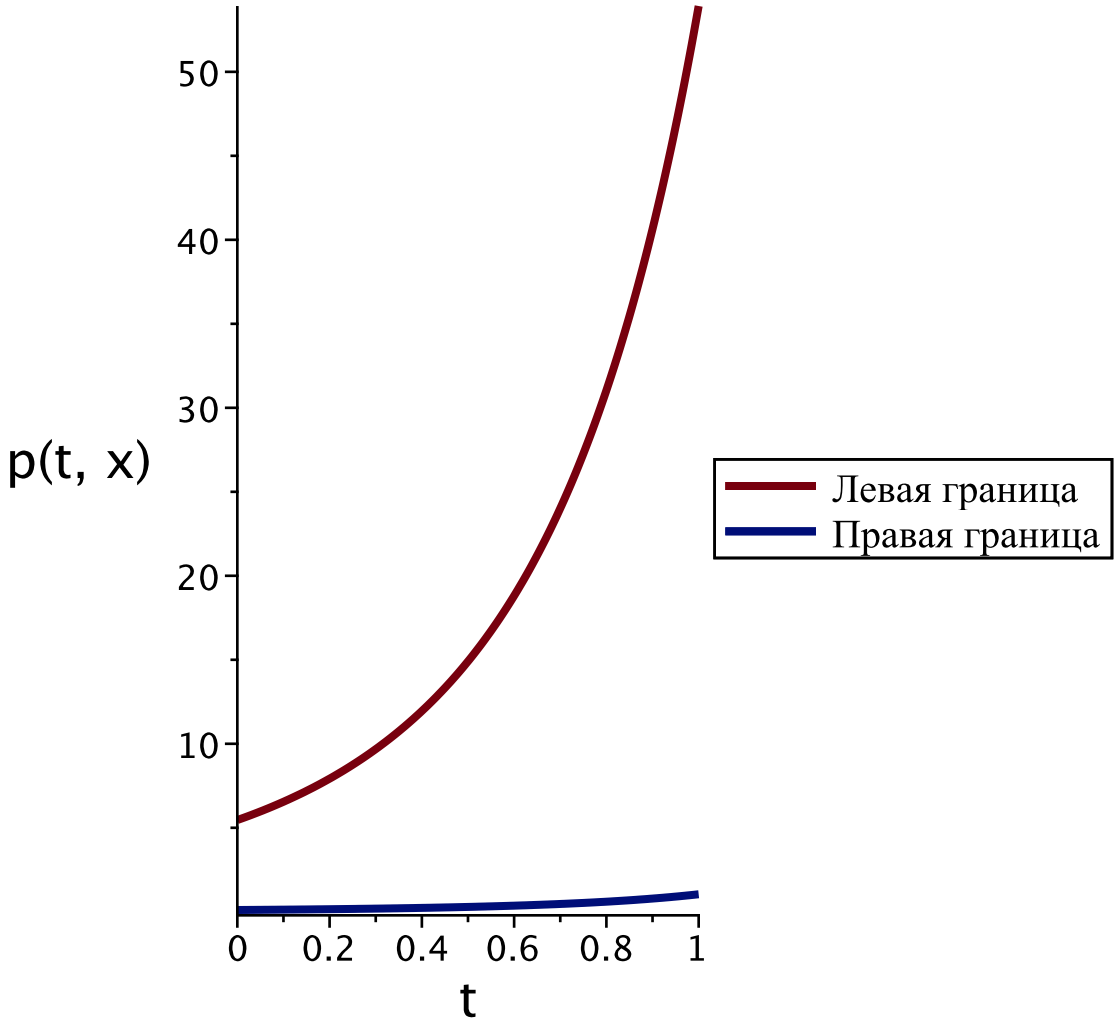
  p r i n t f ( "   "          );
  plot([LeftBound, RightBound], t=0..T, labels=["t","p(t, x)"],
  labelfont = ["HELVETICA", 15],
  l e g e n d = [ "   " ,   "   " ] ,                legendstyle =
  [font = ["HELVETICA", 15], location = right], thickness = 3,
  axesfont=["HELVETICA",10]);
  plot([InitialData, subs(t=T, PartSolution)], x=l..L, labels=
  ["x","p(t, x)"], labelfont = ["HELVETICA", 15],
  l e g e n d = [ "   " ,   "   " ] ,
  legendstyle = [font = ["HELVETICA", 15], location = right],
  thickness = 3, axesfont=["HELVETICA",10]);
```

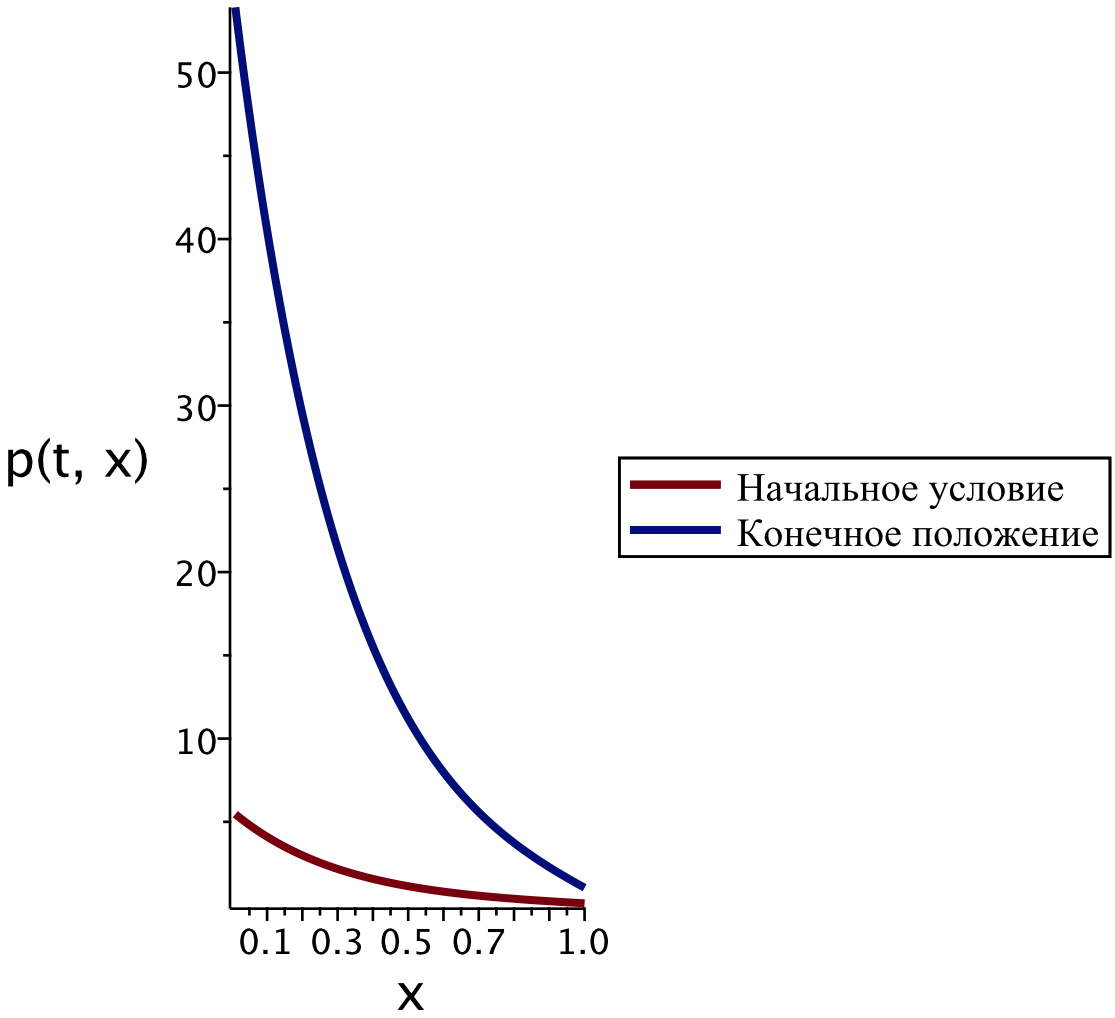
( )

$$p2 = \left(m2(x) = \_C1\, e^{\frac{\sqrt{C2}\, x}{\sqrt{A2}}} + \_C2\, e^{-\frac{\sqrt{C2}\, x}{\sqrt{A2}}} \right)$$

$$add\left(\frac{t^k}{\Gamma(0.5\,k + 0.5)}, k = 0..12 \right) \left(-0.01\, e^{3.162277659\, x} + 10.\, e^{-3.162277659\, x} \right)$$

$$\left(0.5641895835 + t + 1.128379167\, t^2 + t^3 + 0.7522527782\, t^4 + 0.5000000000\, t^5 + 0.3009011113\, t^6 + 0.1666666667\, t^7 + 0.08597174604\, t^8 + 0.04166666667\, t^9 + 0.01910483246\, t^{10} + 0.008333333333\, t^{11} + 0.003473605902\, t^{12}\right) \left(-0.01\, e^{3.162277659\, x} + 10.\, e^{-3.162277659\, x} \right)$$





[ ]

```
> #-------------------------------------------------------------
  --------
  #-------------------------                                  --
  -------
  #-------------------------------------------------------------
  --------
  solverOsred:=proc(stepPerm, coefPerm, stepPoros, coefPoros,
  l, L, pl0, pL0, Kosh, SetkaX, SetkaT)
            local Kapprox, Mapprox, PDE, IBC, pds, g;
            local solut, NSetkaX, NSetkaT, shagX, shagT, i, j,
  U, Ux, kUx, Ut;
            #option remember:
```

```
            # ,     ,

            Kapprox:=(x)^stepPerm*coefPerm:
            Mapprox:=(x)^stepPoros*coefPoros:
            PDE := Mapprox*diff(u(x, t), t) = diff(Kapprox*diff
(u(x, t),x), x);
            IBC := {u(l, t) = pl0, u(x, 0) = Kosh, u(L, t) =
pL0}:
            pds := pdsolve(PDE, IBC, numeric, time=t, range=l..
L, compile=true):
            pds:-value(output = listprocedure);
            solut:=subs(%[3], u(x, t)):
            #
            NSetkaX:=numelems(SetkaX):
            NSetkaT:=numelems(SetkaT):
            shagX:=SetkaX[2]-SetkaX[1]:
            shagT:=SetkaT[2]-SetkaT[1]:
            for i from 1 to NSetkaX do
                        for j from 1 to NSetkaT do
                                    U[i, j]:=solut(SetkaX[i],
SetkaT[j]):
                        od:
            od:
            #subs(x=SetkaX[i], Kapprox)*
            for i from 1 to NSetkaX-1 do
                        for j from 1 to NSetkaT do
                                    Ux[i, j]:=(solut(SetkaX[i+1],
SetkaT[j])-solut(SetkaX[i], SetkaT[j]))/shagX:
                        od:
            od:
if 0=1 then
            #subs(x=SetkaX[i+1], Kapprox)*
            for i from 1 to NSetkaX do
                        for j from 1 to NSetkaT-1 do
                                    Ut[i, j]:=(solut(SetkaX[i],
SetkaT[j+1])-solut(SetkaX[i], SetkaT[j]))/shagT:
                        od:
            od:
fi:

             [U, Ux, Ut]
end proc:


#
minimizeFun:=proc(Fun)
            local i, j ,NCoef, NStep, dddd, NomerMin:

            NStep:=numelems(Fun):
            NCoef:=numelems(Fun[1]):
            dddd:=Matrix([seq([seq(Fun[i,j,3], i = 1 .. NStep)
], j = 1 .. NCoef)]);
            NomerMin:=min[index](dddd);

            [Fun[NomerMin[2],NomerMin[1],1],Fun[NomerMin[2],
NomerMin[1],2],Fun[NomerMin[2],NomerMin[1],3]]:
```

```
            evalf(%);
end proc:


#
maximizeFun:=proc(Fun)
            local i, j ,NCoef, NStep, dddd, NomerMax:

            NStep:=numelems(Fun):
            NCoef:=numelems(Fun[1]):
            dddd:=Matrix([seq([seq(Fun[i,j,3], i = 1 .. NStep)
], j = 1 .. NCoef)]);
            NomerMax:=max[index](dddd);

            [Fun[NomerMax[2],NomerMax[1],1],Fun[NomerMax[2],
NomerMax[1],2],Fun[NomerMax[2],NomerMax[1],3]]:
            evalf(%);
end proc:


#     1 2
FunPieceMinusStep:=proc(Piece, LeftStep, RightStep, NStep,
LeftCoef, RightCoef, NCoef, SetkaX)
            local i,j:
            local Coef, Step, NSetkaX, RaznicaStupStepen,
RaznicaStupStepenDiskret, Gunkzional:

            Coef:=SetkaRavnomer(LeftCoef, RightCoef, NCoef);
            Step:=SetkaRavnomer(LeftStep, RightStep, NStep);
            NSetkaX:=numelems(SetkaX):
            RaznicaStupStepen:=(Piece-BB*x^AA)^2:
            RaznicaStupStepenDiskret:=add(eval
(RaznicaStupStepen, x = SetkaX[hh])*(SetkaX[hh]-SetkaX[hh-1]
), hh=2..NSetkaX):
            for i from 1 to NStep+1 do
                        for j from 1 to NCoef+1 do
                                    Gunkzional[i,j]:=subs(BB=Coef
[j], AA=Step[i], RaznicaStupStepenDiskret):
                        od:
            od:

            seq([seq([Step[i], Coef[j], Gunkzional[i,j]], i = 1
.. NStep+1)], j = 1 .. NCoef+1)
end proc:


> weight1 := 1:
  weight2 := 1:
  weight3 := 1:

  #-------------
  #
  NTwant := 10:
  NTstart := 1:
```

```
NTend := 10:
#-------------

#
Na := 20:
Nb := 20:
aEnd := 1:
bEnd := 1:
aStart := 0.01:   #
bStart := 0:  #

SetkaA := SetkaRavnomer(aStart, aEnd, Na):
SetkaB := SetkaRavnomer(bStart, bEnd, Nb):

#
shagX:=SetkaX[2]-SetkaX[1]:
shagT:=SetkaT[2]-SetkaT[1]:
for j from 1 to Na do
          for k from 1 to Nb do
                    NaSetkePowerNumericSol := solverOsred
(SetkaB[k], SetkaA[j], 0, 1, 1, L, LeftBound, RightBound,
InitialData, SetkaX, SetkaT):
                    for vv from 1 to Nt+1 do
                    for hh from 1 to Nx do
                              f[vv, hh] := weight1*
(NaSetkePowerNumericSol[1][hh, vv]-NaSetkeFractDerivSol[vv,
hh])^2/max(NaSetkePowerNumericSol[1][hh, vv],
NaSetkeFractDerivSol[vv, hh])^2+
                                        weight2*(SetkaA[j]
*SetkaX[hh]^SetkaB[j]*NaSetkePowerNumericSol[2][hh, vv]-a2*
(NaSetkeFractDerivSol[vv, hh+1]-NaSetkeFractDerivSol[vv, hh])
/shagX)^2/max(abs(SetkaA[j]*SetkaX[hh]^SetkaB[j]
*NaSetkePowerNumericSol[2][hh, vv]), a2*abs
(NaSetkeFractDerivSol[vv, hh+1]-NaSetkeFractDerivSol[vv, hh])
/shagX)^2:

#
                    od:
                    f[vv, Nx+1] := weight1*
(NaSetkePowerNumericSol[1][Nx+1, vv]-NaSetkeFractDerivSol[vv,
Nx+1])^2+weight3*(a2-SetkaA[j]*SetkaX[Nx+1]^SetkaB[j])^2:

                    od:

                    FunRaznica[j, k] := shagT*shagX*add(add(f
[vv, hh], hh=2..Nx+1), vv=2..Nt+1):
                    NaSetkePowerNumericSol := 0:
                    f := 0:
                    printf("a=%f, b=%f, Funkcional=%f \n",
SetkaA[j], SetkaB[k], FunRaznica[j, k]);
          od:
          printf("========================== \n");
od:

#
For3dPlot := [seq([seq([SetkaA[jj], SetkaB[kk], FunRaznica
[jj, kk]], jj=1..Na)], kk=1..Nb)]:
```

```
MinimumAandB := minimizeFun(For3dPlot):
p r i n t f ( "        " ) :
print(MinimumAandB):
surfdata(For3dPlot, labels = [a, b, 'F'], labelfont =
["Verdana", bold, 14], shading=none, axes=boxed);

#end proc:
```

```
a=0.010000, b=0.000000, Funkcional=1.312960
a=0.010000, b=0.050000, Funkcional=1.317668
a=0.010000, b=0.100000, Funkcional=1.322036
a=0.010000, b=0.150000, Funkcional=1.326072
a=0.010000, b=0.200000, Funkcional=1.329785
a=0.010000, b=0.250000, Funkcional=1.333187
a=0.010000, b=0.300000, Funkcional=1.336293
a=0.010000, b=0.350000, Funkcional=1.339117
a=0.010000, b=0.400000, Funkcional=1.341676
a=0.010000, b=0.450000, Funkcional=1.343986
a=0.010000, b=0.500000, Funkcional=1.346066
a=0.010000, b=0.550000, Funkcional=1.347933
a=0.010000, b=0.600000, Funkcional=1.349604
a=0.010000, b=0.650000, Funkcional=1.351097
a=0.010000, b=0.700000, Funkcional=1.352428
a=0.010000, b=0.750000, Funkcional=1.353613
a=0.010000, b=0.800000, Funkcional=1.354668
a=0.010000, b=0.850000, Funkcional=1.355606
a=0.010000, b=0.900000, Funkcional=1.356441
a=0.010000, b=0.950000, Funkcional=1.357184
==========================
a=0.059500, b=0.000000, Funkcional=1.031710
a=0.059500, b=0.050000, Funkcional=1.050152
a=0.059500, b=0.100000, Funkcional=1.067893
a=0.059500, b=0.150000, Funkcional=1.084847
a=0.059500, b=0.200000, Funkcional=1.100950
a=0.059500, b=0.250000, Funkcional=1.116157
a=0.059500, b=0.300000, Funkcional=1.130442
a=0.059500, b=0.350000, Funkcional=1.143794
a=0.059500, b=0.400000, Funkcional=1.156217
a=0.059500, b=0.450000, Funkcional=1.167727
a=0.059500, b=0.500000, Funkcional=1.178349
a=0.059500, b=0.550000, Funkcional=1.188115
a=0.059500, b=0.600000, Funkcional=1.197065
a=0.059500, b=0.650000, Funkcional=1.205241
a=0.059500, b=0.700000, Funkcional=1.212690
a=0.059500, b=0.750000, Funkcional=1.219456
a=0.059500, b=0.800000, Funkcional=1.225590
a=0.059500, b=0.850000, Funkcional=1.231136
a=0.059500, b=0.900000, Funkcional=1.236142
a=0.059500, b=0.950000, Funkcional=1.240651
==========================
a=0.109000, b=0.000000, Funkcional=0.789182
a=0.109000, b=0.050000, Funkcional=0.816594
a=0.109000, b=0.100000, Funkcional=0.844047
a=0.109000, b=0.150000, Funkcional=0.871203
a=0.109000, b=0.200000, Funkcional=0.897769
a=0.109000, b=0.250000, Funkcional=0.923500
a=0.109000, b=0.300000, Funkcional=0.948201
```

a=0.109000, b=0.350000, Funkcional=0.971719
a=0.109000, b=0.400000, Funkcional=0.993945
a=0.109000, b=0.450000, Funkcional=1.014809
a=0.109000, b=0.500000, Funkcional=1.034274
a=0.109000, b=0.550000, Funkcional=1.052336
a=0.109000, b=0.600000, Funkcional=1.069011
a=0.109000, b=0.650000, Funkcional=1.084340
a=0.109000, b=0.700000, Funkcional=1.098374
a=0.109000, b=0.750000, Funkcional=1.111179
a=0.109000, b=0.800000, Funkcional=1.122826
a=0.109000, b=0.850000, Funkcional=1.133391
a=0.109000, b=0.900000, Funkcional=1.142952
a=0.109000, b=0.950000, Funkcional=1.151584
==========
a=0.158500, b=0.000000, Funkcional=0.587196
a=0.158500, b=0.050000, Funkcional=0.616742
a=0.158500, b=0.100000, Funkcional=0.648144
a=0.158500, b=0.150000, Funkcional=0.680756
a=0.158500, b=0.200000, Funkcional=0.713980
a=0.158500, b=0.250000, Funkcional=0.747282
a=0.158500, b=0.300000, Funkcional=0.780192
a=0.158500, b=0.350000, Funkcional=0.812312
a=0.158500, b=0.400000, Funkcional=0.843312
a=0.158500, b=0.450000, Funkcional=0.872935
a=0.158500, b=0.500000, Funkcional=0.900987
a=0.158500, b=0.550000, Funkcional=0.927338
a=0.158500, b=0.600000, Funkcional=0.951912
a=0.158500, b=0.650000, Funkcional=0.974679
a=0.158500, b=0.700000, Funkcional=0.995650
a=0.158500, b=0.750000, Funkcional=1.014869
a=0.158500, b=0.800000, Funkcional=1.032403
a=0.158500, b=0.850000, Funkcional=1.048339
a=0.158500, b=0.900000, Funkcional=1.062772
a=0.158500, b=0.950000, Funkcional=1.075807
==========
a=0.208000, b=0.000000, Funkcional=0.431898
a=0.208000, b=0.050000, Funkcional=0.456887
a=0.208000, b=0.100000, Funkcional=0.486188
a=0.208000, b=0.150000, Funkcional=0.518901
a=0.208000, b=0.200000, Funkcional=0.554141
a=0.208000, b=0.250000, Funkcional=0.591072
a=0.208000, b=0.300000, Funkcional=0.628929
a=0.208000, b=0.350000, Funkcional=0.667020
a=0.208000, b=0.400000, Funkcional=0.704742
a=0.208000, b=0.450000, Funkcional=0.741581
a=0.208000, b=0.500000, Funkcional=0.777117
a=0.208000, b=0.550000, Funkcional=0.811021
a=0.208000, b=0.600000, Funkcional=0.843050
a=0.208000, b=0.650000, Funkcional=0.873042
a=0.208000, b=0.700000, Funkcional=0.900905
a=0.208000, b=0.750000, Funkcional=0.926608
a=0.208000, b=0.800000, Funkcional=0.950173
a=0.208000, b=0.850000, Funkcional=0.971658
a=0.208000, b=0.900000, Funkcional=0.991156
a=0.208000, b=0.950000, Funkcional=1.008777
==========
a=0.257500, b=0.000000, Funkcional=0.323539

```
a=0.257500, b=0.050000, Funkcional=0.339423
a=0.257500, b=0.100000, Funkcional=0.361381
a=0.257500, b=0.150000, Funkcional=0.389089
a=0.257500, b=0.200000, Funkcional=0.421670
a=0.257500, b=0.250000, Funkcional=0.458068
a=0.257500, b=0.300000, Funkcional=0.497237
a=0.257500, b=0.350000, Funkcional=0.538196
a=0.257500, b=0.400000, Funkcional=0.580047
a=0.257500, b=0.450000, Funkcional=0.621993
a=0.257500, b=0.500000, Funkcional=0.663346
a=0.257500, b=0.550000, Funkcional=0.703528
a=0.257500, b=0.600000, Funkcional=0.742079
a=0.257500, b=0.650000, Funkcional=0.778647
a=0.257500, b=0.700000, Funkcional=0.812983
a=0.257500, b=0.750000, Funkcional=0.844932
a=0.257500, b=0.800000, Funkcional=0.874420
a=0.257500, b=0.850000, Funkcional=0.901443
a=0.257500, b=0.900000, Funkcional=0.926051
a=0.257500, b=0.950000, Funkcional=0.948336
============================
a=0.307000, b=0.000000, Funkcional=0.257352
a=0.307000, b=0.050000, Funkcional=0.262679
a=0.307000, b=0.100000, Funkcional=0.274426
a=0.307000, b=0.150000, Funkcional=0.293150
a=0.307000, b=0.200000, Funkcional=0.318778
a=0.307000, b=0.250000, Funkcional=0.350545
a=0.307000, b=0.300000, Funkcional=0.387306
a=0.307000, b=0.350000, Funkcional=0.427838
a=0.307000, b=0.400000, Funkcional=0.470964
a=0.307000, b=0.450000, Funkcional=0.515595
a=0.307000, b=0.500000, Funkcional=0.560753
a=0.307000, b=0.550000, Funkcional=0.605588
a=0.307000, b=0.600000, Funkcional=0.649382
a=0.307000, b=0.650000, Funkcional=0.691553
a=0.307000, b=0.700000, Funkcional=0.731649
a=0.307000, b=0.750000, Funkcional=0.769348
a=0.307000, b=0.800000, Funkcional=0.804437
a=0.307000, b=0.850000, Funkcional=0.836806
a=0.307000, b=0.900000, Funkcional=0.866430
a=0.307000, b=0.950000, Funkcional=0.893352
============================
a=0.356500, b=0.000000, Funkcional=0.231122
a=0.356500, b=0.050000, Funkcional=0.224195
a=0.356500, b=0.100000, Funkcional=0.223955
a=0.356500, b=0.150000, Funkcional=0.231241
a=0.356500, b=0.200000, Funkcional=0.246612
a=0.356500, b=0.250000, Funkcional=0.270036
a=0.356500, b=0.300000, Funkcional=0.300749
a=0.356500, b=0.350000, Funkcional=0.337509
a=0.356500, b=0.400000, Funkcional=0.378928
a=0.356500, b=0.450000, Funkcional=0.423642
a=0.356500, b=0.500000, Funkcional=0.470386
a=0.356500, b=0.550000, Funkcional=0.518015
a=0.356500, b=0.600000, Funkcional=0.565534
a=0.356500, b=0.650000, Funkcional=0.612097
a=0.356500, b=0.700000, Funkcional=0.657019
a=0.356500, b=0.750000, Funkcional=0.699767
```

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a=0.356500, b=0.900000, Funkcional=0.811745
a=0.356500, b=0.950000, Funkcional=0.843176
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a=0.406000, b=0.400000, Funkcional=0.305064
a=0.406000, b=0.450000, Funkcional=0.347165
a=0.406000, b=0.500000, Funkcional=0.393139
a=0.406000, b=0.550000, Funkcional=0.441550
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a=0.455500, b=0.450000, Funkcional=0.286963
a=0.455500, b=0.500000, Funkcional=0.329736
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a=0.455500, b=0.950000, Funkcional=0.755741
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```

```
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a=0.505000, b=0.850000, Funkcional=0.628169
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a=0.554500, b=0.550000, Funkcional=0.283952
a=0.554500, b=0.600000, Funkcional=0.328670
a=0.554500, b=0.650000, Funkcional=0.377975
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a=0.653500, b=0.100000, Funkcional=0.329938
a=0.653500, b=0.150000, Funkcional=0.298439
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a=0.653500, b=0.700000, Funkcional=0.360584
a=0.653500, b=0.750000, Funkcional=0.412441
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```

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============================
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a=0.851500, b=0.800000, Funkcional=0.382672
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```
a=0.901000, b=0.650000, Funkcional=0.271852
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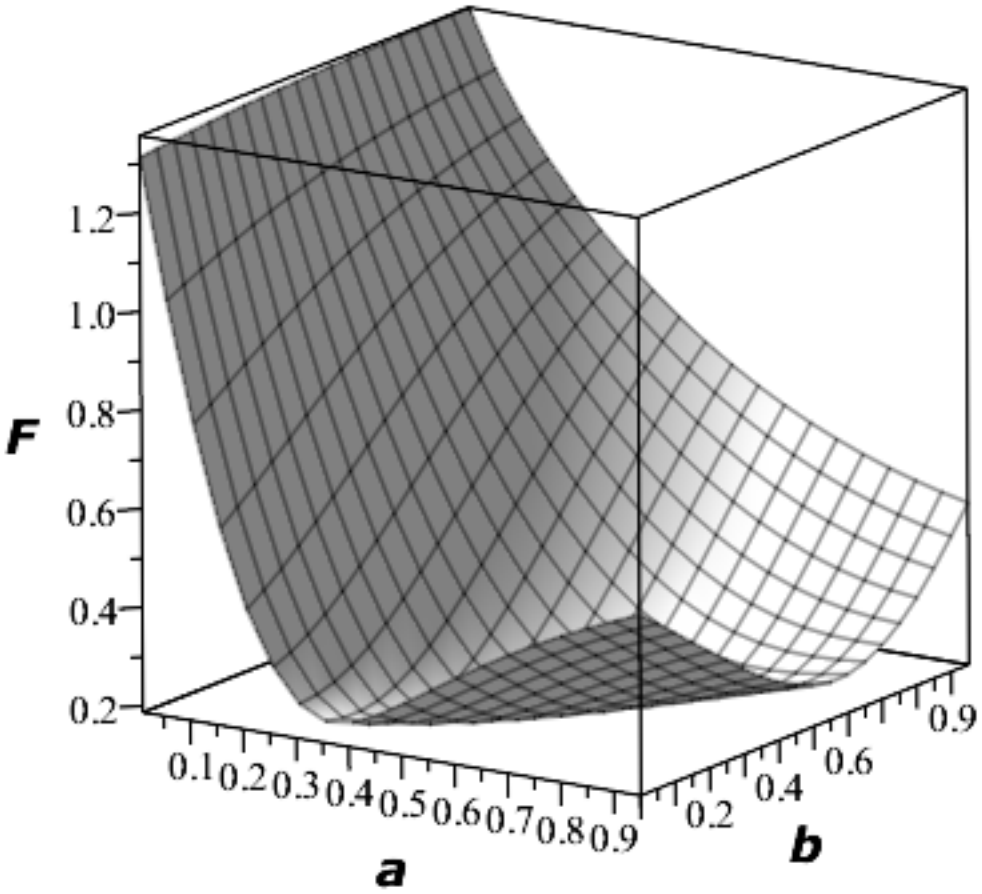
============================
```

[0.5050000000, 0.3000000000, 0.187174360127205]




```
> if 0=1:
  #1
                                    f[hh] := weight1*
  (NaSetkePowerNumericSol[1][hh, NTwant]-NaSetkeFractDerivSol
  [NTwant, hh])^2/max(NaSetkePowerNumericSol[1][hh, NTwant],
  NaSetkeFractDerivSol[NTwant, hh])^2+
                                                  weight2*
  (NaSetkePowerNumericSol[2][hh, NTwant]-(NaSetkeFractDerivSol
  [NTwant, hh+1]-NaSetkeFractDerivSol[NTwant, hh])/shagX)^2/max
  (abs(NaSetkePowerNumericSol[2][hh, NTwant]), abs
  (NaSetkeFractDerivSol[NTwant, hh+1]-NaSetkeFractDerivSol
  [NTwant, hh])/shagX)^2+
                                                  weight3*(a2-SetkaA
  [j]*SetkaX[hh]^SetkaB[j])^2/max(a2, SetkaA[j]*SetkaX[hh]
  ^SetkaB[j])^2:

  #2
  f[Nx+1] := weight1*(NaSetkePowerNumericSol[1][Nx+1, NTwant]-
  NaSetkeFractDerivSol[NTwant, Nx+1])^2+weight3*(a2-SetkaA[j]
  *SetkaX[Nx+1]^SetkaB[j])^2:
  fi:
  #FunPieceMinusStep:=proc(a2, b2, weight1, weight2, weight3)
```

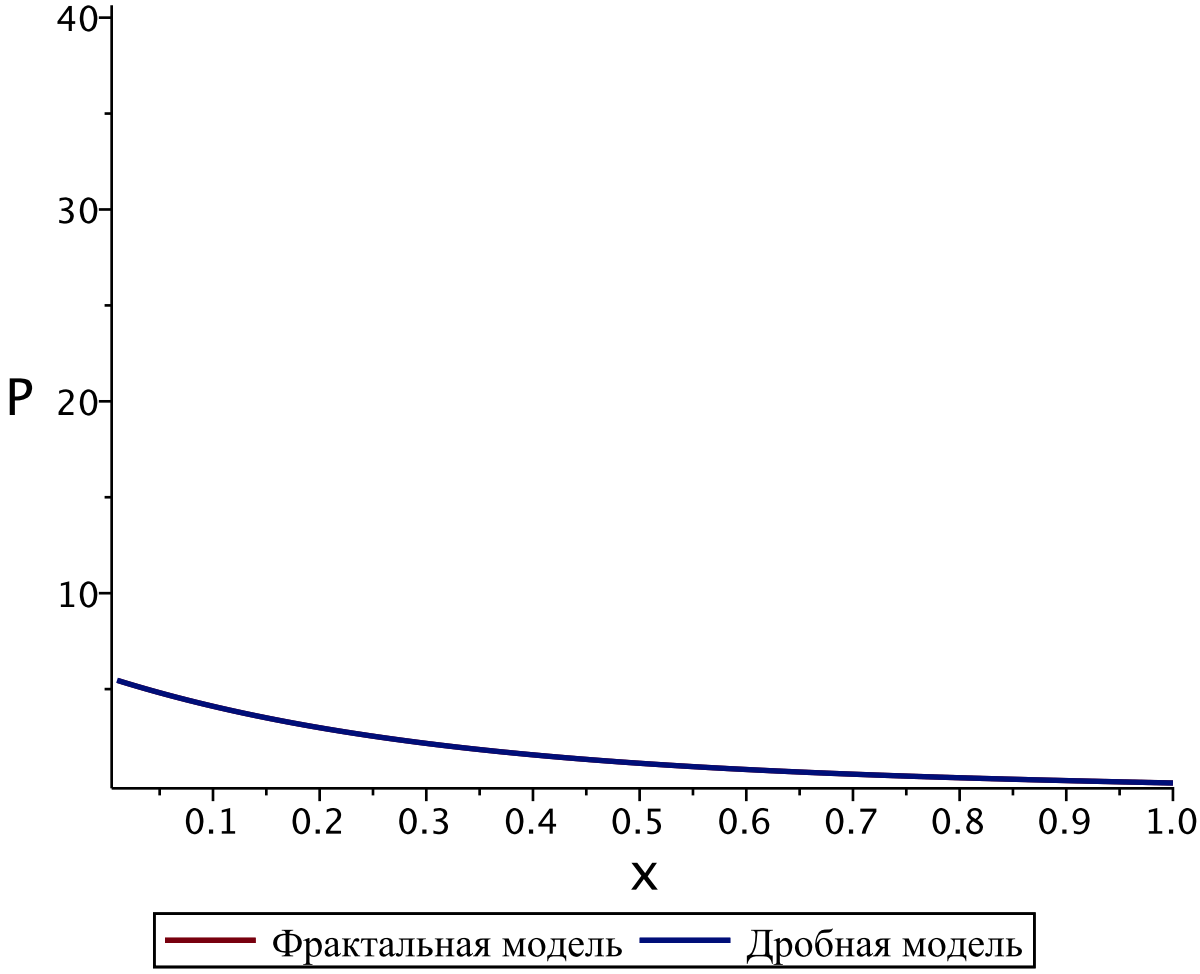
```
> #
  #plots[animate]( plot, [[seq([SetkaX[i], subs(t=SetkaT[trunc(j)],
  x=SetkaX[i], ForHelp[2])], i=1..Nx+1)]], j=1..Nt):
  MinimumAandB:=[.5050000000, .3000000000]:

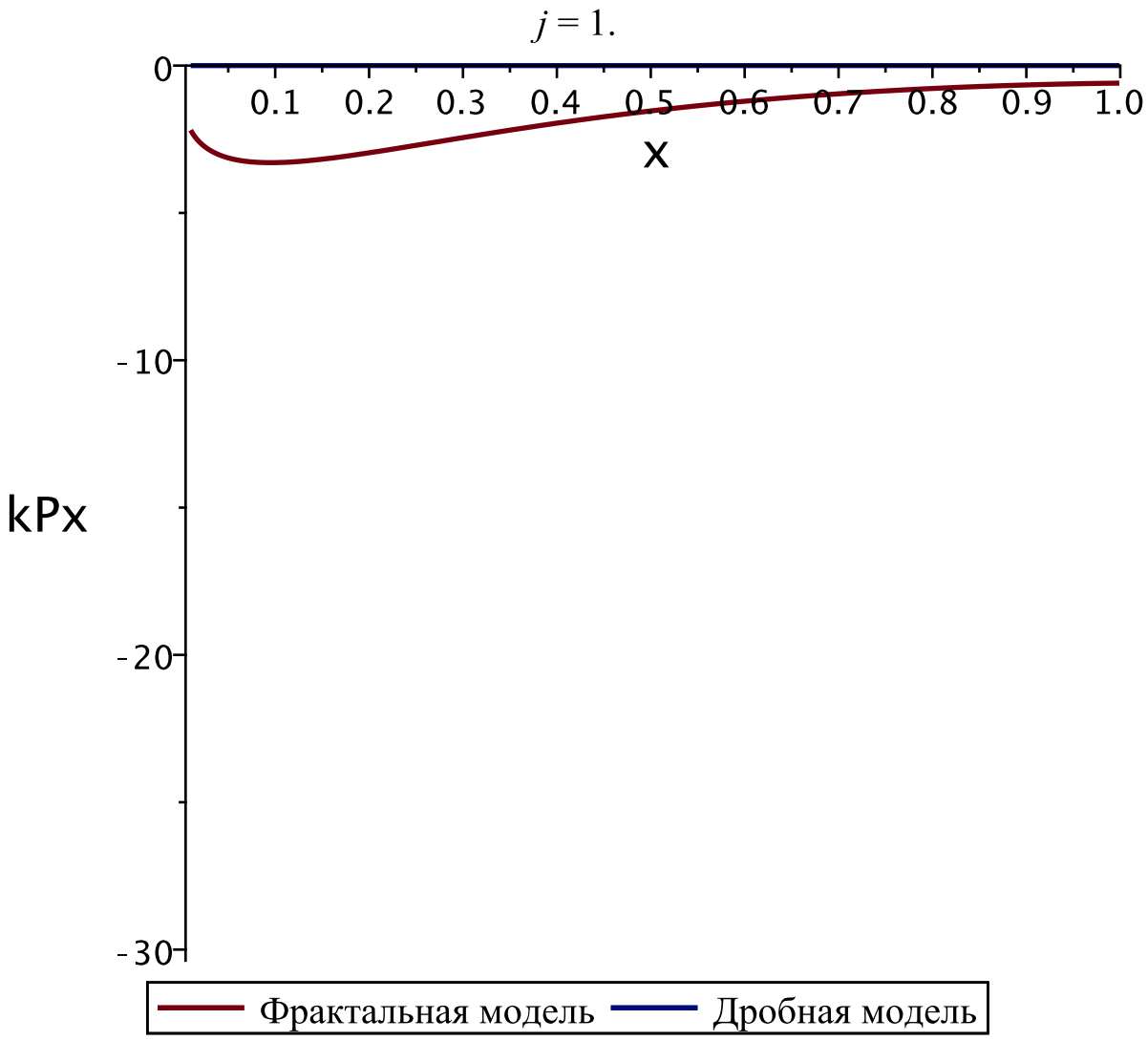
  NumericSol3 := solverOsred(MinimumAandB[2], MinimumAandB[1], 0,
  1, l, L, LeftBound, RightBound, InitialData, SetkaX, SetkaT):
  j:='j':
  plots[animate]( plot, [[[seq([SetkaX[i], NumericSol3[1][i, trunc
  (j)]], i=1..Nx+1)],
                                  [seq([SetkaX[i], subs(t=SetkaT
  [trunc(j)], x=SetkaX[i], ForHelp[2])], i=1..Nx+1)]], legend=
  [ "   " ,   "   " ]                          ], j=1..Nt, thickness =
  2, labels=["x","P"], labelfont = ["HELVETICA", 15], axesfont=
  ["HELVETICA",10], legendstyle = [font = ["HELVETICA", 15],
  location = bottom], trace = 5);
  plots[animate]( plot, [[[seq([SetkaX[i], MinimumAandB[1]*SetkaX
  [i]^MinimumAandB[2]*NumericSol3[2][i, trunc(j)]], i=1..Nx+1)],
                                  [seq([SetkaX[i], a2*
  (NaSetkeFractDerivSol[trunc(j), i+1]-NaSetkeFractDerivSol[trunc
  (j), i])/shagX], i=1..Nx+1)]], l e g e n d = [ "   " ,
  "   " ]           ], j=1..Nt, thickness = 2, labels=["x","kPx"],
  labelfont = ["HELVETICA", 15], axesfont=["HELVETICA",10],
  legendstyle = [font = ["HELVETICA", 15], location = bottom],
  trace = 5);

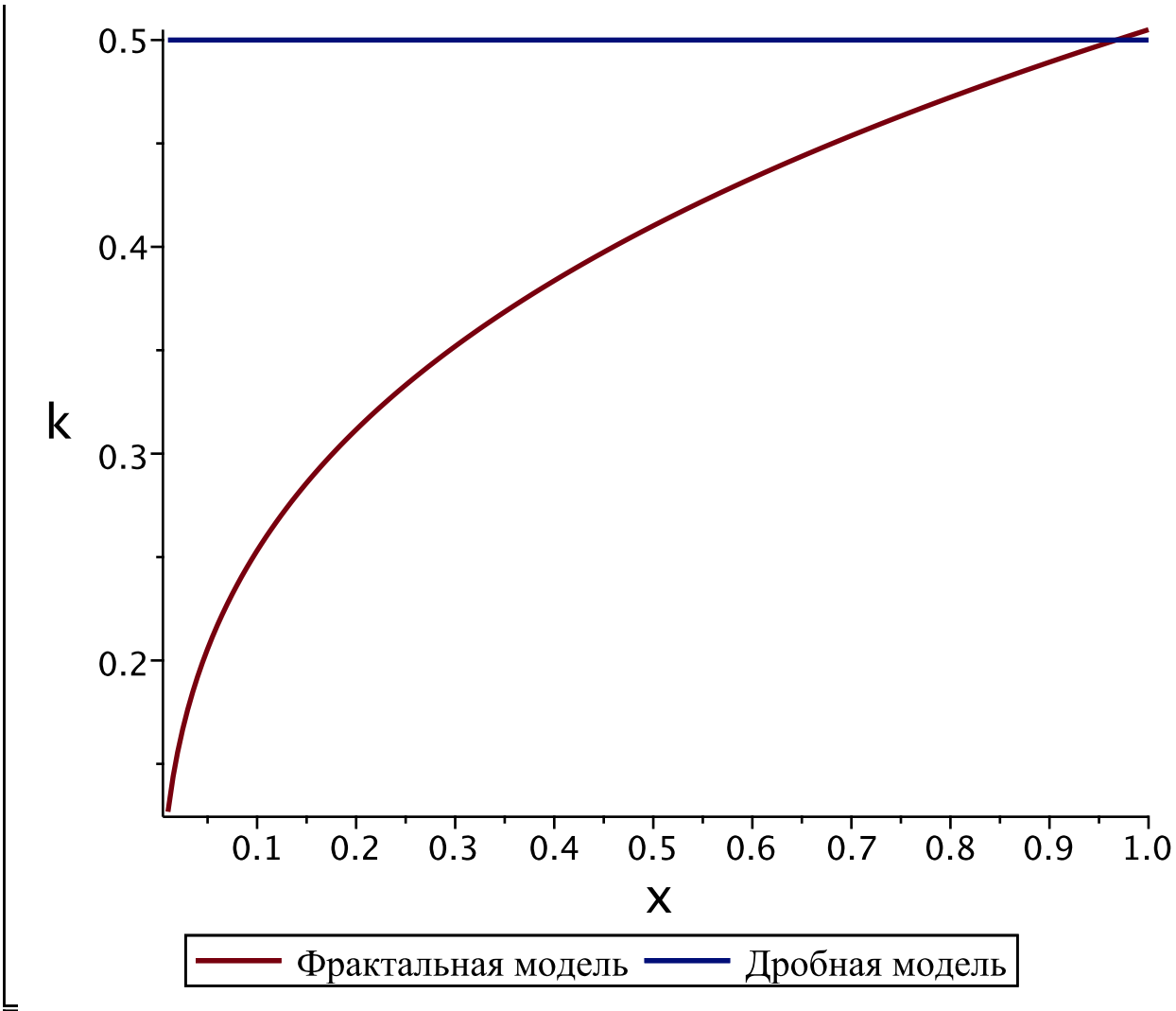
  plot([MinimumAandB[1]*x^MinimumAandB[2], a2], x=1..L, labels=
  ["x","k"], labelfont = ["HELVETICA", 15], axesfont=["HELVETICA",
  10], legendstyle = [font = ["HELVETICA", 15], location = bottom],
  thickness = 2, l e g e n d = [ "   " ,   "   " ]                    );


  #plot([LeftBound, RightBound], t=0..T, labels=["t","p(t, x)"],
  labelfont = ["HELVETICA", 15],
  #l e g e n d = [ "   " ,   "   " ] ,                 legendstyle = [font
  = ["HELVETICA", 15], location = right], thickness = 3, axesfont=
  ["HELVETICA",10]);
```

$j = 1.$


40
30
P
20
10
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x
Фрактальная модель
Дробная модель


$j = 1.$
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
x
-10
-20
-30
kPx
Фрактальная модель
Дробная модель




```
> NumericSol3;
```

$$solverOsred(0.3000000000, 0.5050000000, 0, 1, 0.01, 1, 5.460451711 + 9.678398663\,t + 10.92090342\,t^2 + 9.678398663\,t^3 + 7.280602283\,t^4 + 4.839199332\,t^5 + 2.912240913\,t^6 + 1.613066444\,t^7 + 0.8320688319\,t^8 + 0.4032666110\,t^9 + 0.1849041849\,t^{10} + 0.08065332219\,t^{11} + 0.03361894272\,t^{12}, 0.1055309664 + 0.1870487678\,t + 0.2110619328\,t^2 + 0.1870487678\,t^3 + 0.1407079552\,t^4 + 0.09352438390\,t^5 + 0.05628318210\,t^6 + 0.03117479464\,t^7 + 0.01608090916\,t^8 + 0.007793698659\,t^9 + 0.003573535371\,t^{10} + 0.001558739732\,t^{11} + 0.0006497337038\,t^{12}, -0.005641895835\,e^{3.162277659\,x} + 5.641895835\,e^{-3.162277659\,x}, [0.01, 0.01990000000, 0.02980000000, 0.03970000000, 0.04960000000, 0.05950000000, 0.06940000000, 0.07930000000, 0.08920000000, 0.09910000000, 0.1090000000, 0.1189000000, 0.1288000000, 0.1387000000, 0.1486000000, 0.1585000000, 0.1684000000, 0.1783000000, 0.1882000000, 0.1981000000, 0.2080000000, 0.2179000000, 0.2278000000, 0.2377000000, 0.2476000000, 0.2575000000, 0.2674000000, 0.2773000000, 0.2872000000, 0.2971000000, 0.3070000000, 0.3169000000, 0.3268000000, 0.3367000000, 0.3466000000, 0.3565000000, 0.3664000000, \quad (1)$$

```
  0.3763000000, 0.3862000000, 0.3961000000, 0.4060000000, 0.4159000000,
  0.4258000000, 0.4357000000, 0.4456000000, 0.4555000000, 0.4654000000,
  0.4753000000, 0.4852000000, 0.4951000000, 0.5050000000, 0.5149000000,
  0.5248000000, 0.5347000000, 0.5446000000, 0.5545000000, 0.5644000000,
  0.5743000000, 0.5842000000, 0.5941000000, 0.6040000000, 0.6139000000,
  0.6238000000, 0.6337000000, 0.6436000000, 0.6535000000, 0.6634000000,
  0.6733000000, 0.6832000000, 0.6931000000, 0.7030000000, 0.7129000000,
  0.7228000000, 0.7327000000, 0.7426000000, 0.7525000000, 0.7624000000,
  0.7723000000, 0.7822000000, 0.7921000000, 0.8020000000, 0.8119000000,
  0.8218000000, 0.8317000000, 0.8416000000, 0.8515000000, 0.8614000000,
  0.8713000000, 0.8812000000, 0.8911000000, 0.9010000000, 0.9109000000,
  0.9208000000, 0.9307000000, 0.9406000000, 0.9505000000, 0.9604000000,
  0.9703000000, 0.9802000000, 0.9901000000, 1 ], [ 0, 0.1000000000, 0.2000000000,
  0.3000000000, 0.4000000000, 0.5000000000, 0.6000000000, 0.7000000000,
  0.8000000000, 0.9000000000, 1 ])
> #
  a2_show := 10^(-10): #
  b2_show  := 0.2: #
  #
  c2_show  := 0.000000001: #
  c_x21_show  := 0.0000001: #
  c_x22_show  := 0.000001: #




  sol02 := ExactMeshSolution(T, l, L, a2_show, 0.2, c2_show,
  c_x21_show, c_x22_show, Nx, Nt):
  NaSetkeFractDerivSol := sol02[1]:
  PartSolution02 := sol02[2]:

  sol05 := ExactMeshSolution(T, l, L, a2_show, 0.5, c2_show,
  c_x21_show, c_x22_show, Nx, Nt):
  NaSetkeFractDerivSol := sol05[1]:
  PartSolution05 := sol05[2]:

  sol08 := ExactMeshSolution(T, l, L, a2_show, 0.8, c2_show,
  c_x21_show, c_x22_show, Nx, Nt):
  NaSetkeFractDerivSol := sol08[1]:
  PartSolution08 := sol08[2]:

  j:='j':
  plots[animate]( plot, [[
  [seq([SetkaX[i], subs(t=SetkaT[trunc(j)], x=SetkaX[i],
  PartSolution02)], i=1..Nx+1)],
  [seq([SetkaX[i], subs(t=SetkaT[trunc(j)], x=SetkaX[i],
  PartSolution05)], i=1..Nx+1)],
  [seq([SetkaX[i], subs(t=SetkaT[trunc(j)], x=SetkaX[i],
  PartSolution08)], i=1..Nx+1)]],  l e g e n d = [ '       =0.2', 0.5,
```

```
  0.8]], j=1..Nt);
```

$$p2 = \left(m2(x) = \_C1\, e^{\frac{\sqrt{C2}\, x}{\sqrt{A2}}} + \_C2\, e^{-\frac{\sqrt{C2}\, x}{\sqrt{A2}}} \right)$$

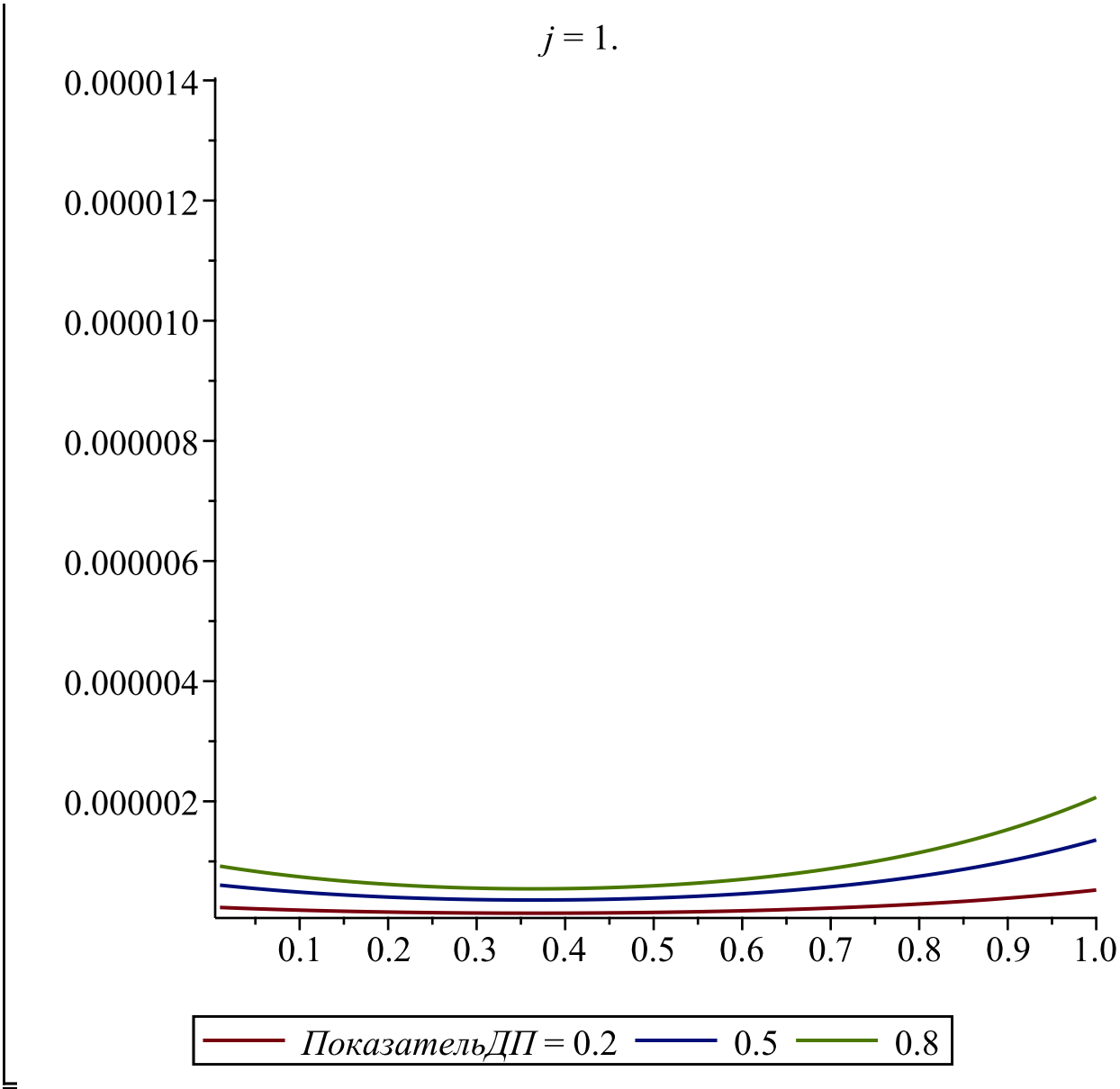
$$add\left(\frac{t^k}{\Gamma(0.2\, k + 0.2)}, k = 0..12 \right) \left(1.\, 10^{-7}\, e^{3.162277660\, x} + 1.\, 10^{-6}\, e^{-3.162277660\, x} \right)$$

$$p2 = \left(m2(x) = \_C1\, e^{\frac{\sqrt{C2}\, x}{\sqrt{A2}}} + \_C2\, e^{-\frac{\sqrt{C2}\, x}{\sqrt{A2}}} \right)$$

$$add\left(\frac{t^k}{\Gamma(0.5\, k + 0.5)}, k = 0..12 \right) \left(1.\, 10^{-7}\, e^{3.162277660\, x} + 1.\, 10^{-6}\, e^{-3.162277660\, x} \right)$$

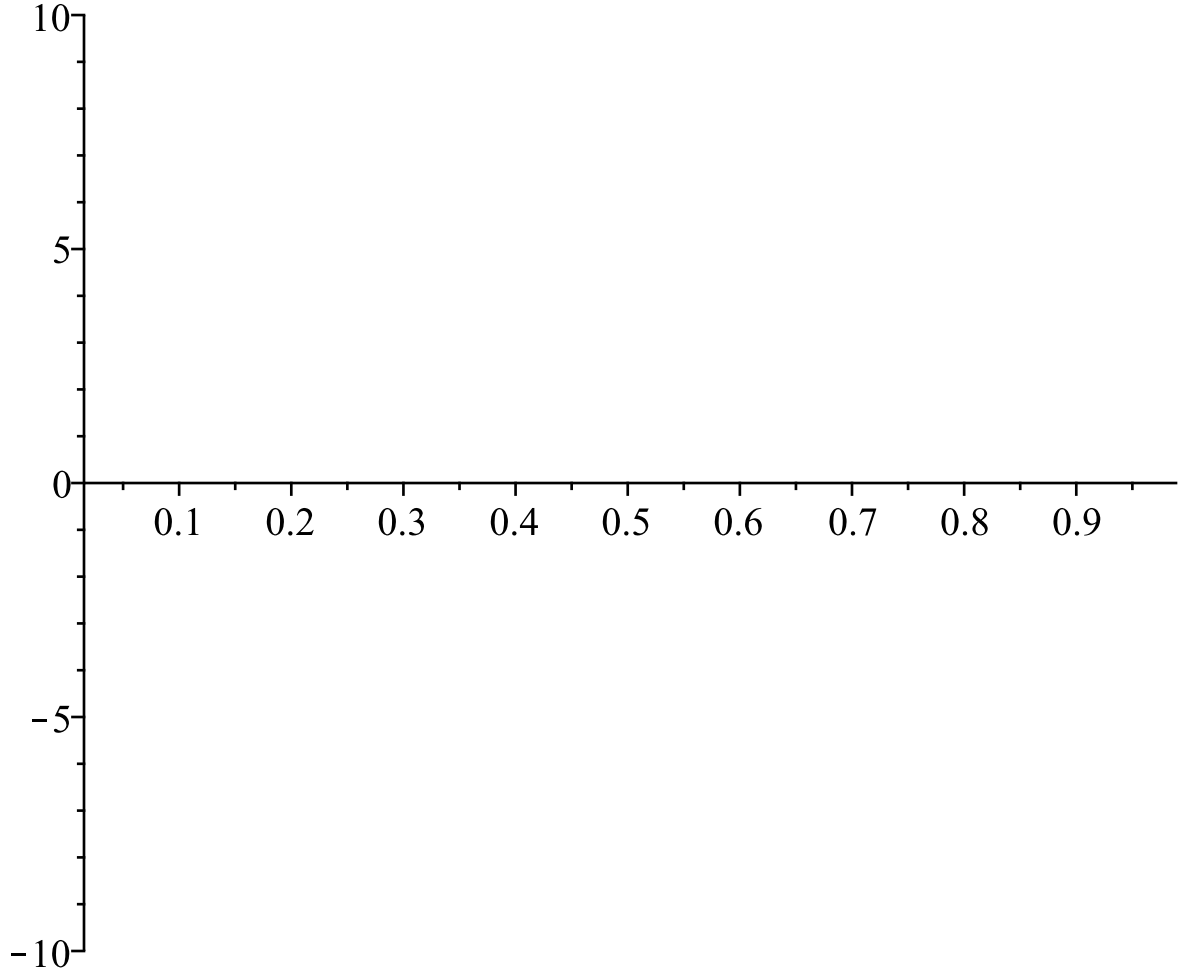
$$p2 = \left(m2(x) = \_C1\, e^{\frac{\sqrt{C2}\, x}{\sqrt{A2}}} + \_C2\, e^{-\frac{\sqrt{C2}\, x}{\sqrt{A2}}} \right)$$

$$add\left(\frac{t^k}{\Gamma(0.8\, k + 0.8)}, k = 0..12 \right) \left(1.\, 10^{-7}\, e^{3.162277660\, x} + 1.\, 10^{-6}\, e^{-3.162277660\, x} \right)$$




```
> j:='j':
  h:=SetkaX[2]-SetkaX[1]:
  plots[animate]( plot, [[
  [seq([SetkaX[i], (subs(t=SetkaT[trunc(j)], x=SetkaX[i+1],
  PartSolution02)
  +2*subs(t=SetkaT[trunc(j)], x=SetkaX[i], PartSolution02)
  -subs(t=SetkaT[trunc(j)], x=SetkaX[i-1], PartSolution02))/h^2],
  i=2..Nx)],
  [seq([SetkaX[i], (subs(t=SetkaT[trunc(j)], x=SetkaX[i+1],
  PartSolution05)
  +2*subs(t=SetkaT[trunc(j)], x=SetkaX[i], PartSolution05)
  -subs(t=SetkaT[trunc(j)], x=SetkaX[i-1], PartSolution05))/h^2],
  i=2..Nx)],
  [seq([SetkaX[i], (subs(t=SetkaT[trunc(j)], x=SetkaX[i+1],
  PartSolution08)
  +2*subs(t=SetkaT[trunc(j)], x=SetkaX[i], PartSolution08)
  -subs(t=SetkaT[trunc(j)], x=SetkaX[i-1], PartSolution08))/h^2],
  i=2..Nx)]]], j=1..Nt);
```

$j = 1.$




```
>
  fff:=aa*x^bb-(kk/GAMMA(alpha)+kk*(1-alpha)/GAMMA(alpha)*x)

  for j from 1 to Na do
            for k from 1 to Nb do
                      FunRaznica[j, k] := subs(aa, fff):
                      printf("a=%f, b=%f, Funkcional=%f \n", SetkaA
  [j], SetkaB[k], FunRaznica[j, k]);
            od:
            printf("========================== \n");
  od:
Error, `)` unexpected
```