

## Aplikační příklad 2.2 (metoda Crank- Nicolsonové)

```
% Axialni disperze hmoty probihajici za izotermnich podminek
% du/dt = 1/Pe * d2u/dx2 - du/dx + Da*(1-u)
% du/dx(0,t) = Pe*u(0,t) , du/dx(1,t) = 0
% u(x,0) = 0
% Pe = 10, Da = 0.03

a = 0;
b = 1;
n = 10;
m = 40;
k = 0.05;
g = inline('1/10','x','t');
e = inline('-1','x','t');
f = inline('0.03*(1-u)','x','t','u');
df = inline('-0.03','x','t','u');
alpha1 = 10;
beta1 = inline('-1','t');
gamma1 = inline('0','t');
alpha2 = 0;
beta2 = inline('1','t');
gamma2 = inline('0','t');
phi = inline('0','x');

u = PDEParabCN(n,m,k,a,b,g,e,f,df,alpha1,alpha2,beta1,beta2,gamma1,gamma2,phi);

h = (b-a)/n; x = a:h:b; t = (0:k:m*k)';
figure;
hold on;
for j = 1:m+1
    plot(x,u(j,:), 'b');
end
title({'Axialni disperze hmoty probihajici za izotermnich podminek'; 'Pe = 10'});
xlabel('x');
ylabel('u(x,t)');
legend('Reseni v ruznych casech', 'Location', 'Northwest');
hold off;

figure;
surf(x,t,u);
shading interp;
colorbar;
xlabel('x');
ylabel('t');
zlabel('u(x,t)');
title({'Axialni disperze hmoty probihajici za izotermnich podminek'; 'Pe = 10'});

%-----
% Pe = 200, Da = 0.03
% Pro tyto parametry je nutna hustsi sit v promenne x
n = 50;
g = inline('1/200','x','t');
alpha1 = 200;

u = PDEParabCN(n,m,k,a,b,g,e,f,df,alpha1,alpha2,beta1,beta2,gamma1,gamma2,phi);
```

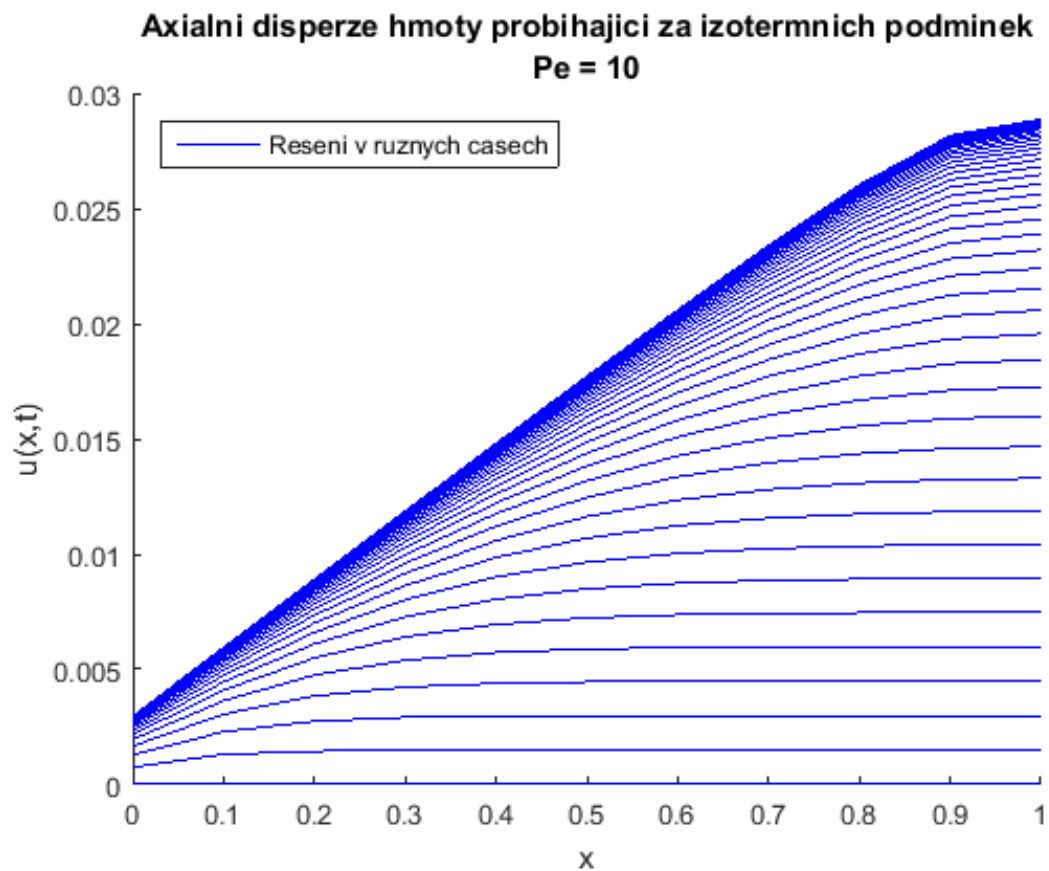
```

h = (b-a)/n; x = a:h:b; t = (0:k:m*k)';

figure;
hold on;
for j = 1:m+1
    plot(x,u(j,:), 'b');
end
title({'Axialni disperze hmoty probihajici za izotermnich podminek'; 'Pe = 200'});
xlabel('x');
ylabel('u(x,t)');
legend('Reseni v ruznych casech', 'Location', 'Northwest');
hold off;

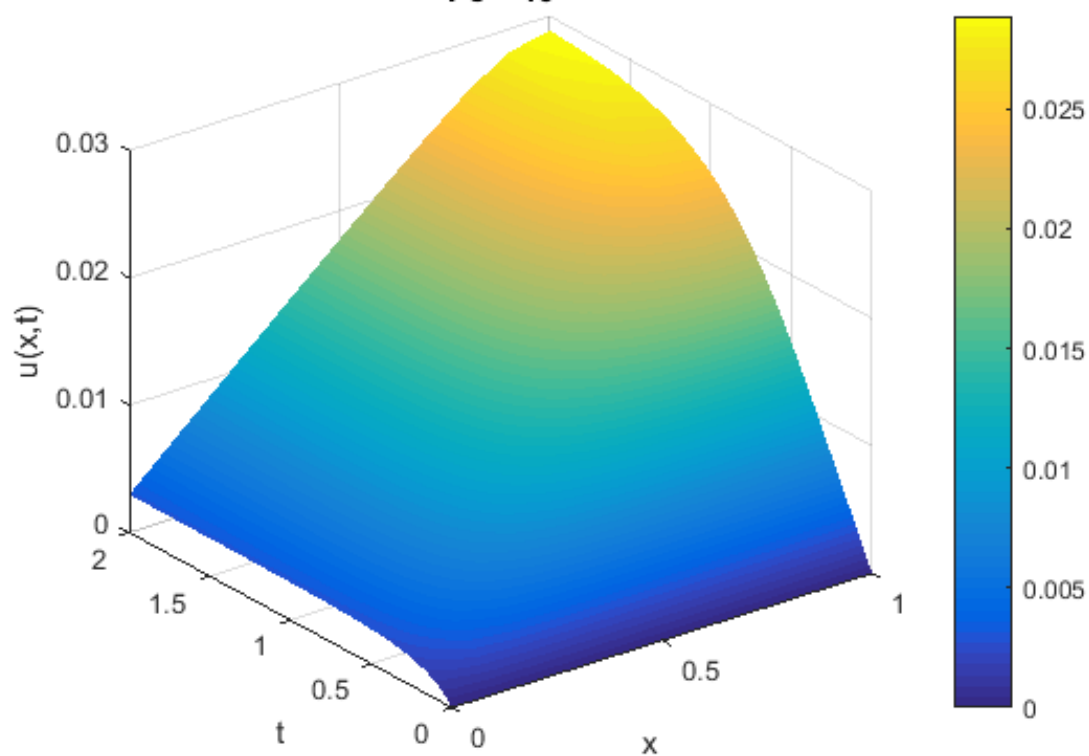
figure;
surf(x,t,u);
shading interp;
colorbar;
xlabel('x');
ylabel('t');
zlabel('u(x,t)');
title({'Axialni disperze hmoty probihajici za izotermnich podminek'; 'Pe = 200'});

```



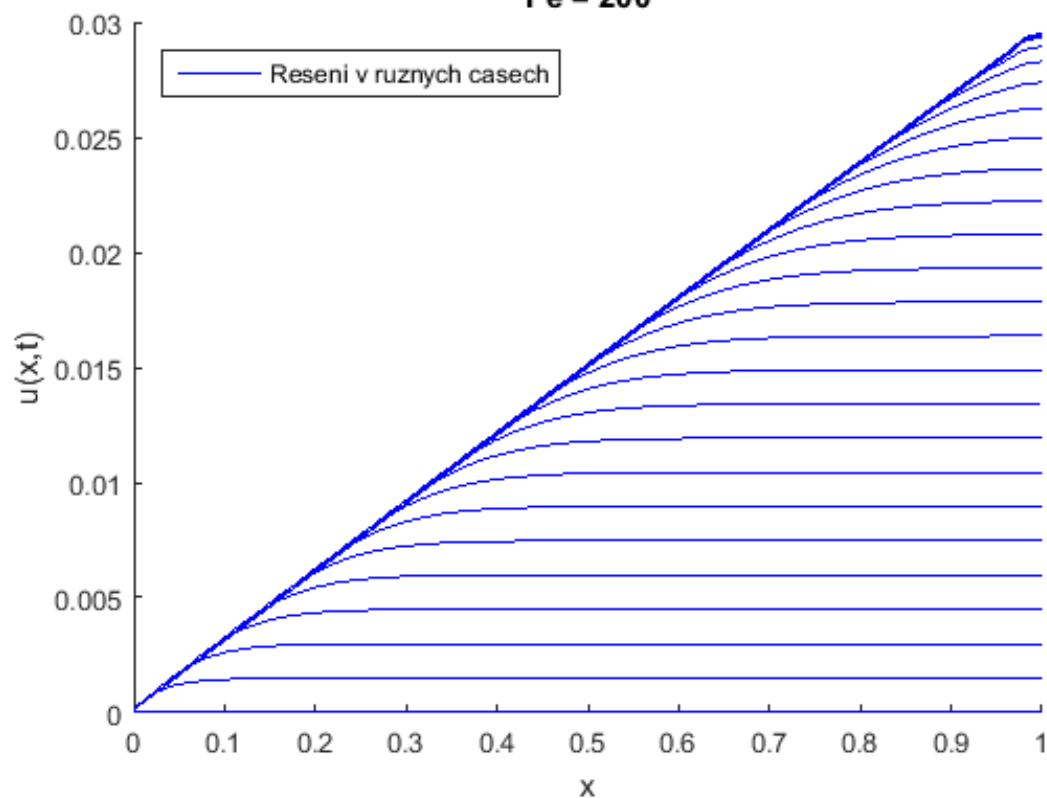
# Axialni disperze hmoty probihajici za izotermnich podminek

Pe = 10



## Axialni disperze hmoty probihajici za izotermnich podminek

Pe = 200



Axialni disperze hmoty probihajici za izotermnich podminek

$Pe = 200$

