

```
% Příklad 13.4
clear all
close all

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% fazove pole %%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

xh=-3.5:0.2:3; yh = -2:0.2:3; % rozsah v x, y takovy, ze obsahuje oba BR
[x,y] = meshgrid(xh,yh);
tx = x-2*y+1;    % x-ove slozky 1. derivace reseni ulohy 13.4
ty = 1./x-y;     % y-ove slozky 1. derivace

    % ttx, tty - normalizace vektoru 1. derivace:
p = sqrt(tx.*tx + ty.*ty); % velikost vektoru 1.derivace
z = find(p<0.00001); % aby se nedelilo 0 v BR
p(z) = 1;
ttx = 0.8*tx./p; % 0.8 je empiricka konst., vypada to nejlip
tty = 0.8*ty./p;

    % v kazdem bode site xh,yh se nakresli vektor [ttx, tty]
quiver(xh, yh, ttx, tty);
grid minor on
title('Fazove pole','fontsize',16)
```

```
% fazove pole v okoli B = [1,1]
% - stejny postup jako vyse, jen jiny vyrez v rovine xy
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```
xh=0.06:0.1:3; yh = -1:0.1:3.2;
[x,y] = meshgrid(xh,yh);
tx = x-2*y+1;
ty = 1./x-y;
```

```
p = sqrt(tx.*tx + ty.*ty);
z = find(p<0.00001);
p(z) = 1;
ttx = 0.8*tx./p;
tty = 0.8*ty./p;
```

```
figure % novy obrazek
quiver(xh, yh, ttx, tty);
grid minor on
title('Fazove pole v okoli B = [1,1]','fontsize',16)
```

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%% trajektorie v okoli B %%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
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```
z=x.*y-log(abs(x))-y.^2+y; % prvni integral soustavy
```

```
figure
colormap(gray); % nastaveni barevnosti na cernobilou
contourf(x,y,z,30) % izokrivky funkce z: cim vyssi hodnoty, tim svetlejsi
grid minor on
hold on
    % doplneni poloprimek trajektori ulohy linearizovane v okoli B
p=sqrt(3)/2;
plot([0.1 2.6],[(1/2+p)*(-0.9)+1, (1/2+p)*1.6+1],'k','linewidth',2)
plot([0.1 3],[(1/2-p)*(-0.9)+1, (1/2-p)*2+1],'k','linewidth',2)
title('Fazovy obraz v okoli B = [1,1]','fontsize',16)
```

```
% trajektorie ulohy linearizovane v B, posunute do pocatku
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```
xh=-1:0.1:2; yh = -2:0.1:2.2;
[x,y] = meshgrid(xh,yh);
zz=x.*y+x.^2/2-y.^2; % prvni integral linearizovane soustavy
```

```
figure
colormap(gray);
contourf(x,y,zz,30)
hold on
    % poloprimek trajektorie
plot([-1 2],[-1/2+p, (1/2-p)*2],'k','linewidth',2)
plot([-1 1.6],[-1/2-p, (1/2+p)*1.6],'k','linewidth',2)
grid minor on
title('Fazovy obraz ulohy linearizovane v B = [1,1]','fontsize',16)
```