Příloha 4 – implementace analytické úlohy v softwaru MatLab

```matlab
%% ANALYTICKA ROVNICE
kappa = 10;
c0 = 0.01;
p = 0.13;
lambda = 0.01;

xspan = linspace(0,10,5000);

funkce = @(x,phi) [phi(2), 0.5*phi(2)^2*sin(phi(1))/cos(phi(1)) +
sin(phi(1))/(2*(cos(phi(1)))^3)*(c0^2 + p/kappa*2*x*sin(phi(1)) +
2*lambda/kappa) + x*p/kappa/cos(phi(1))];

okrpodm = @(phi1a,phi1b) [phi1a(1), phi1b(1) - pi/2];

odhad = bvpinit(xspan, [0 0.001]);

sol = bvp5c(funkce,okrpodm,odhad);

%% ANALYTICKA KRIVKA
psi_an = sol.y(1,:);
dpsi_an = sol.y(2,:);

d_x = diff(xspan);
d_z = d_x .* tan(sol.y(1,1:end-1));
zspan = [0, -cumsum(d_z)];
zspan = zspan - zspan(end);

L = trapz(xspan, 1./cos(psi_an));
A = trapz(xspan, xspan.*tan(psi_an));

%% ANALYTICKA ENERGIE U
U_an = kappa/2 * trapz(xspan,(dpsi_an .* cos(psi_an) - c0).^2 ./
cos(psi_an));
U_an = 4*U_an;


%% GRAF
plot(xspan,zspan, 'k', 'LineWidth', 2)
set(gca, 'FontSize', 35, 'fontname', 'Cambria Math', 'LineWidth', 1.5)
pbaspect([10.5 3 1])
xlabel('{\itx} [\mum]', 'fontSize', 30, 'fontname', 'Times')
ylabel('{\itz} [\mum]', 'fontSize', 30, 'fontname', 'Times')
xlim([0 10.5])
ylim([0 3])
```