Aplikační příklad 1.4

Pravá strana soustavy diferenciálních rovnic a variačních rovnic

```
function dy = ap4_var(x,y)

dy = zeros(size(y));

phi = 1; alpha = 20; beta = 0.1;

dy(1) = y(2);
dy(2) = phi^2 * y(1) * exp((alpha *beta*(1-y(1)))/(1+beta*(1-y(1))));
dy(3) = y(4);
dy(4) = phi^2 * exp((alpha *beta*(1-y(1)))/(1+beta*(1-y(1))))*(1 - y(1) * alpha *beta/(1+beta*(1-y
(1)))^2) * y(3);

end
```

Published with MATLAB® R2015a

Vlastní výpočet metodou střelby

```
% y''= phi^2 * y * exp(alpha *beta *(1-y)/(1+beta(1-y))),
% y'(0)=0, y(1)=1
% phi = 1, alpha = 20, beta = 0.1

a = 0;
b = 1;

alpha1 = 0;
alpha2 = 1;
beta1 = 1;
beta2 = 0;
gamma1 = 0;
gamma2 = 1;

eps = 1e-6;
maxiter = 100;
Lx = linspace(a,b,20);

eta_0 = 1.0;
[y, eta] = MetodaStrelby(@ap4_var,a,b,alpha1,alpha2,beta1,beta2,gamma1,gamma2,eta_0,eps,maxiter,Lx);

if (~isempty(y))
    figure
    plot (Lx, y(:,1))
    title('Neizotermni vnitrni difuze v castici katalyzatoru tvaru desky')
    xlabel('x')
    ylabel('y(x)')
end
```

```
k = 0, eta =   1.00000000e+00
k = 1, eta =   1.47467642e-01, delta =   8.52532358e-01
k = 2, eta =   3.01445329e-01, delta =   1.53977687e-01
k = 3, eta =   3.67145050e-01, delta =   6.56997214e-02
k = 4, eta =   3.74458935e-01, delta =   7.31388425e-03
k = 5, eta =   3.74533368e-01, delta =   7.44329793e-05
k = 6, eta =   3.74533375e-01, delta =   7.54216378e-09
Reseni:
   x      y(x)
0.000,   0.374533
0.053,   0.376217
0.105,   0.381275
0.158,   0.389720
0.211,   0.401576
0.263,   0.416874
0.316,   0.435648
0.368,   0.457934
0.421,   0.483768
0.474,   0.513177
0.526,   0.546183
0.579,   0.582793
0.632,   0.622997
0.684,   0.666769
0.737,   0.714059
0.789,   0.764796
```

```
0.842,   0.818886
0.895,   0.876211
0.947,   0.936635
1.000,   1.000000
```