Aplikační příklad 1.3

Pravá strana soustavy diferenciálních rovnic a variačních rovnic

```
function dy = ap3_var(x,y)

dy = zeros(size(y));

Pe = 10; p = 0.6; k = 14.1; R = 10.85; H = 0.1437;
m = 1;

dfdy1 = (Pe * p * exp(k - R/(1 - H*(1-y(1)))) * (y(1)^m * (1 - H*(1-y(1)))^(-m)) * (m/y(1) - H *
m/(1 - H*(1-y(1))) + H * R/(1 - H*(1-y(1)))^2));
dfdy2 = Pe;

dy(1) = y(2);
dy(2) = Pe * y(2) + Pe * p * (y(1))^m * (1 - H*(1-y(1)))^(-m) * exp(k - R/(1 - H*(1-y(1))));
dy(3) = y(4);
dy(4) = dfdy1 * y(3) + dfdy2 * y(4);

end
```

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Vlastní výpočet metodou střelby

```
% 1/Pe * y'' - y' - p * y^m * T^(-m) * exp (k - R/T) = 0, T = 1 - H*(1-y)
% y(0) - 1/Pe * y'(0) = 1,
% y'(1) = 0

% rovnici resime obracene, od 1 do 0 (jinak metoda nekonverguje)
% v x = 1 dodefinujeme pocatecni podminku pomoci eta a strelbou se snazime splnit
% okrajovou podminku v x = 0
a = 1;
b = 0;

alpha2 = 1;
alpha1 = 0;
beta2 = -1.0/10.0;
beta1 = 1;
gamma2 = 1;
gamma1 = 0;

eps = 1e-6;
maxiter = 10;
Lx = linspace(a,b,20);

eta_0 = 0.1;
[y, eta] = MetodaStrelby(@ap3_var,a,b,alpha1,alpha2,beta1,beta2,gamma1,gamma2,eta_0,eps,maxiter,Lx);

if (~isempty(y))
    figure
    plot (Lx, y(:,1))
    title('Axialni sdileni hmoty a tepla v trubkovem reaktoru')
    xlabel('x')
    ylabel('y(x)')
end
```

```
k = 0, eta =   1.00000000e-01
k = 1, eta =   5.48583326e-02, delta =   4.51416674e-02
k = 2, eta =   4.97964106e-02, delta =   5.06192196e-03
k = 3, eta =   4.38681093e-02, delta =   5.92830134e-03
k = 4, eta =   3.96589736e-02, delta =   4.20913569e-03
k = 5, eta =   3.84902019e-02, delta =   1.16877170e-03
k = 6, eta =   3.84280282e-02, delta =   6.21736835e-05
k = 7, eta =   3.84278648e-02, delta =   1.63358925e-07
Reseni:
   x      y(x)
1.000,   0.038428
0.947,   0.039857
0.895,   0.043436
0.842,   0.048554
0.789,   0.054968
0.737,   0.062642
0.684,   0.071675
0.632,   0.082245
0.579,   0.094624
0.526,   0.109165
0.474,   0.126332
0.421,   0.146732
```

```
0.368,   0.171175
0.316,   0.200756
0.263,   0.237020
0.211,   0.282163
0.158,   0.339597
0.105,   0.414548
0.053,   0.516382
0.000,   0.662210
```