In[1]:=
```
Get[FileNameJoin[{NotebookDirectory[], "DeStrelba.wl"}]]
```

Aplikační příklad 3

Apl. příklad 3: Axiální sdílení hmoty a tepla v trubkovém reaktoru lze na základě difuzního modelu popsat soustavou dvou nelineárních diferenciálních rovnic, které po kombinaci a převedení do bezrozměrného tvaru poskytnou rovnici

$\frac{1}{Pe}\frac{\partial^2 y}{\partial x^2} - \frac{\partial y}{\partial x} - p\, y^m\, T^{-m} e^{\left(K-\frac{R}{T}\right)} = 0$, kde $T = 1\text{-}H(1\text{-}y)$

$y(0) = 1 + \frac{1}{Pe}\frac{\partial y}{\partial x}(0)$, $\frac{\partial y}{\partial x}(1) = 0.$

Použijte parametry Pe=10, p=0.6, K=14.1, R=10.85, m=1.0, H=0.1437

Definice parametrů diferenciální rovnice

In[2]:=
```
Pe = 10;
p = 0.6;
K = 14.1;
R = 10.85;
m = 1.0;
H = 0.1437
```

Out[7]=
```
0.1437
```

Definice pravé strany diferenciální rovnice

In[8]:=
```
f[x_, y1_, y2_] = y2;
g[x_, y1_, y2_] =
  Pe * y2 + Pe * p * y1^m * (1 - H * (1 - y1)) ^ (-m) * Exp[K - R / (1 - H * (1 - y1))];
```

Parametry programu Strelba1/Strelba2

Poznámka: integrujeme od 1.0 do 0.0

In[10]:=
```
a = 1.0;
b = 0.0;
α1 = 0;
α2 = 1;
β1 = 1;
β2 = -1 / Pe;
γ1 = 0;
γ2 = 1;
ϵ = 0.000001;
h = 0.001;
z0 = 0.05;
m = 10;
Lx = Table[N[a + i (b - a) / m], {i, 0, m}];
```

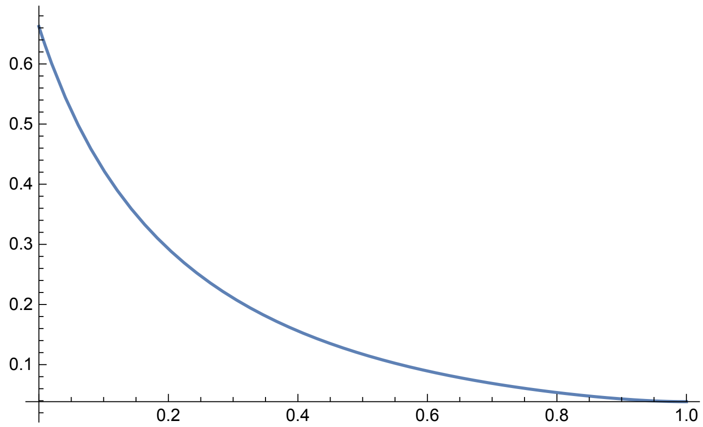
In[23]:=
```
v = Strelba1[f, g, a, b, α1, α2 , β1, β2 , γ1 , γ2 , ϵ, h, z0, Lx];
```

i	z	s
0	0.05	
1	0.0445567	0.00544325
2	0.0402508	0.0043059
3	0.0386401	0.00161076
4	0.0384385	0.000201607
5	0.0384284	0.0000101114
6	0.0384279	4.19034×10^{-7}

Graf řešení u_1(x)

In[24]:=
```
v[[1]]
```

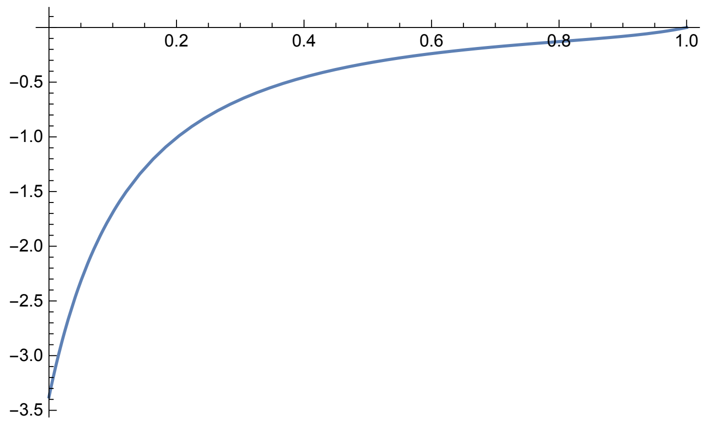
Out[24]=



Graf řešení u_2(x)

In[25]:=
```
v[[2]]
```

Out[25]=



Tabulka řešení u_1(x)

In[26]:= `MatrixForm[v[[3]]]`

Out[26]//MatrixForm=

1.	0.0384279
0.9	0.0430035
0.8	0.0535852
0.7	0.068813
0.6	0.089435
0.5	0.117386
0.4	0.15597
0.3	0.210847
0.2	0.292532
0.1	0.423337
0.	0.662251

Tabulka řešení u_2(x)

In[27]:= `MatrixForm[v[[4]]]`

Out[27]//MatrixForm=

1.	0.
0.9	−0.0809329
0.8	−0.128971
0.7	−0.176948
0.6	−0.238681
0.5	−0.325695
0.4	−0.455057
0.3	−0.659059
0.2	−1.00877
0.1	−1.69215
0.	−3.3775

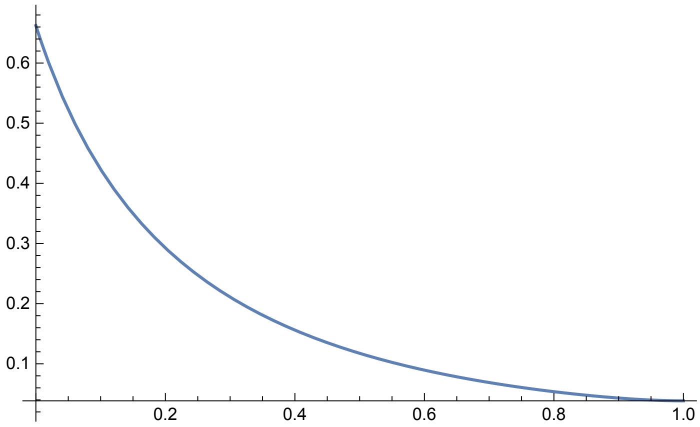
In[28]:= `v = Strelba2[f, g, a, b, α1, α2 , β1, β2 , γ1 , γ2 , ϵ, z0, Lx];`

i	z	s
0	0.05	
1	0.0440663	0.00593369
2	0.039751	0.00431528
3	0.0384999	0.00125115
4	0.0384281	0.0000717335
5	0.0384279	2.11861×10^{-7}

Graf řešení u_1(x)

In[29]:= `v[[1]]`

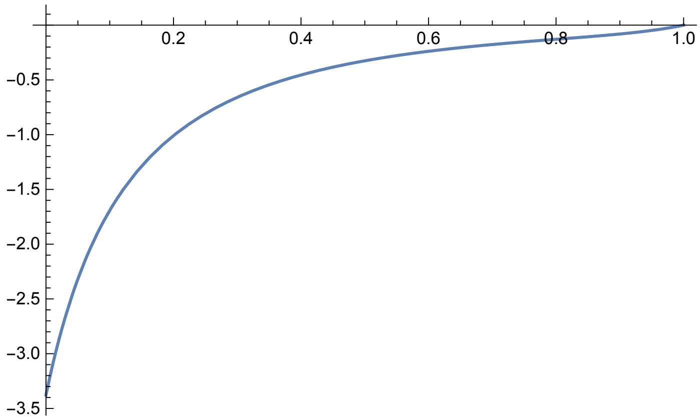
Out[29]=



Graf řešení u_2(x)

In[30]:= `v[[2]]`

Out[30]=



Tabulka řešení u_1(x)

In[31]:= `MatrixForm[v[[3]]]`

Out[31]//MatrixForm=

1.	0.0384279
0.9	0.0430035
0.8	0.0535852
0.7	0.068813
0.6	0.0894349
0.5	0.117386
0.4	0.15597
0.3	0.210847
0.2	0.292532
0.1	0.423337
0.	0.662251

Tabulka řešení u_2(x)

In[32]:=
```
MatrixForm[v[[4]]]
```

Out[32]//MatrixForm=

1.	0.
0.9	-0.0809329
0.8	-0.128971
0.7	-0.176948
0.6	-0.238681
0.5	-0.325695
0.4	-0.455057
0.3	-0.659059
0.2	-1.00877
0.1	-1.69215
0.	-3.37749