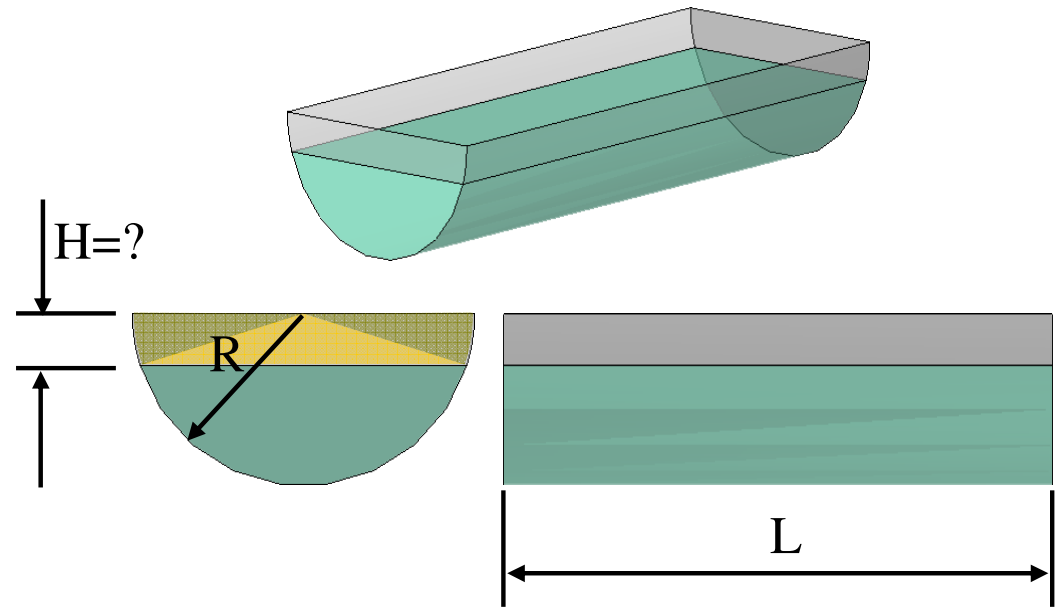


10-1. naloga: določite nivo tekočine v posodi, če je volumen tekočine poznan

$$V = 0.4 \text{ m}^3$$

$$L = 2 \text{ m}$$

$$R = 0.5 \text{ m}$$



$$V = L \left[ 0.5 \pi R^2 - R^2 \arcsin(H/R) - H \sqrt{R^2 - H^2} \right]$$

$$f(H) = V - L \left[ 0.5 \pi R^2 - R^2 \arcsin(H/R) - H \sqrt{R^2 - H^2} \right] = 0$$

# 10-1. naloga: določite nivo tekočine v posodi, če je volumen tekočine poznan

The MATLAB interface displays a script for finding the liquid level in a container using the secant method. The script defines a function  $f(H)$  and iteratively finds the root. A plot shows the function  $f(H)$  vs  $H$ , and the Command Window shows the iteration results.

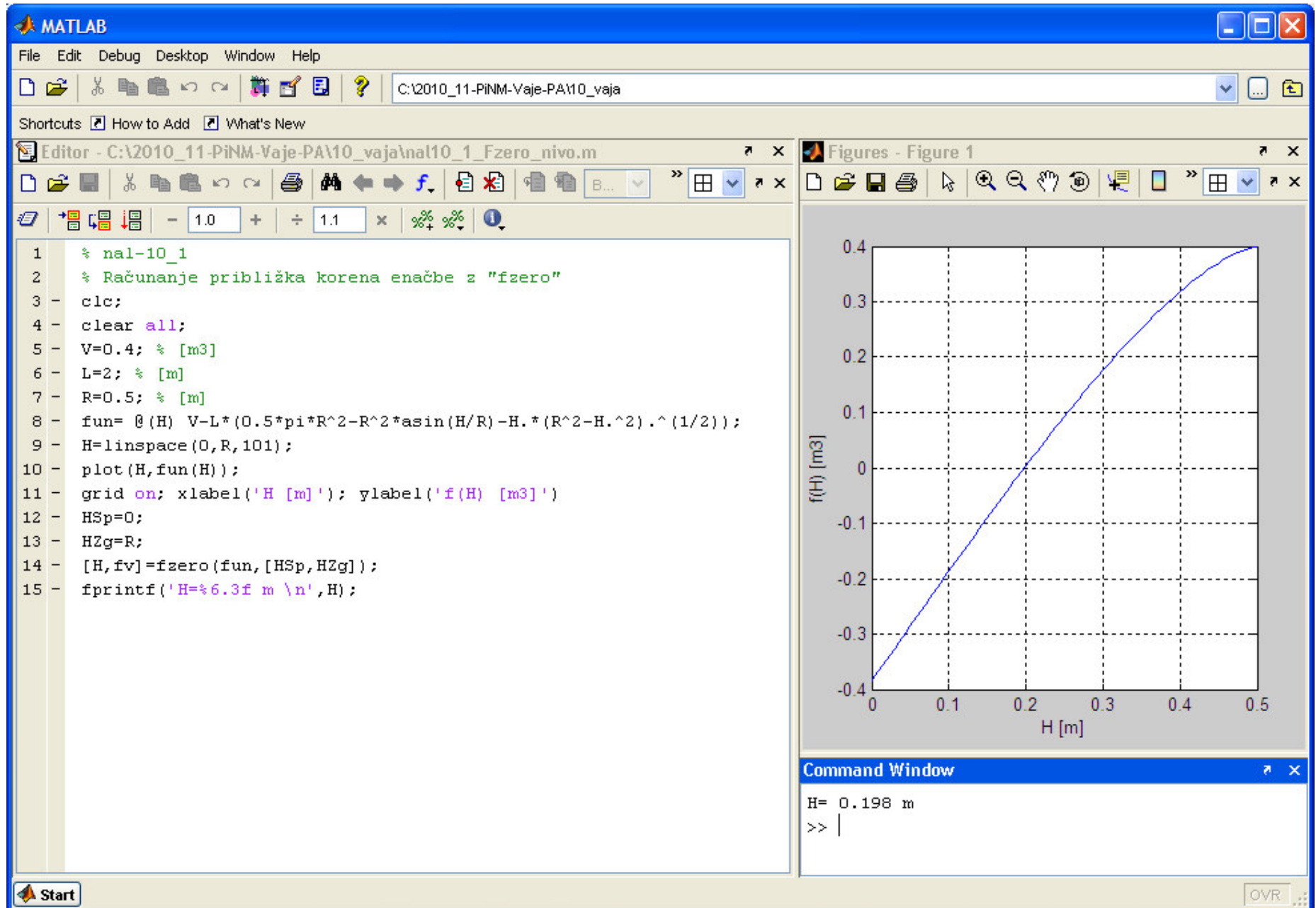
```
1 % nal-10_1
2 % Računanje približka korena enačbe s "sekantno metodo"
3 -
4 clear all;
5 V=0.4; % [m3]
6 L=2; % [m]
7 R=0.5; % [m]
8 fun= @(H) V-L*(0.5*pi*R^2-R^2*asin(H/R)-H.*(R^2-H.^2).^ (1/2));
9 H=linspace(0,R,101);
10 plot(H,fun(H));
11 grid on; xlabel('H [m]'); ylabel('f(H) [m3]')
12 H0=0;
13 H1=R;
14 for i=1:1:1000
15     H2 = H0-fun(H0)*(H1-H0)/(fun(H1)-fun(H0));
16     raz = abs((H2-H1)/H2);
17     if raz < 1.e-6
18         break
19     else
20         H0=H1;
21         H1=H2;
22         fprintf('iter %i H= %10.8f m \n',i,H1);
23         pause
24     end
25 end
26 if H1>=0 & H1<=R
27     fprintf('H=%6.3f m \n',H1);
28 else
29     fprintf('Volumen tekocine ni ustrezen');
30 end
```

The plot shows the function  $f(H)$  vs  $H$ . The x-axis is labeled  $H$  [m] and ranges from 0 to 0.5. The y-axis is labeled  $f(H)$  [m3] and ranges from -0.4 to 0.4. The function is a smooth curve that starts at  $(0, -0.4)$  and ends at  $(0.5, 0.4)$ , crossing the x-axis at approximately  $H = 0.198$ .

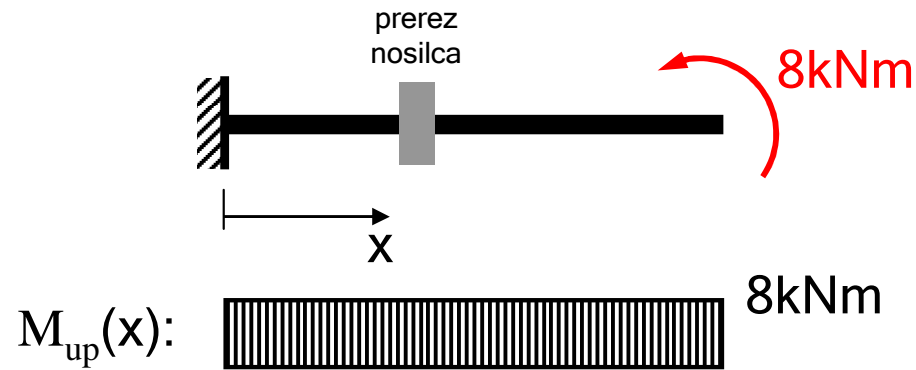
The Command Window shows the iteration results:

```
iter 1 H= 0.24535209 m
iter 2 H= 0.17680951 m
iter 3 H= 0.19850756 m
iter 4 H= 0.19800817 m
iter 5 H= 0.19800340 m
H= 0.198 m
```

# 10-1. naloga: določite nivo tekočine v posodi, če je volumen tekočine poznan



## 10-2. naloga: določite dimenzije pravokotnega prereza

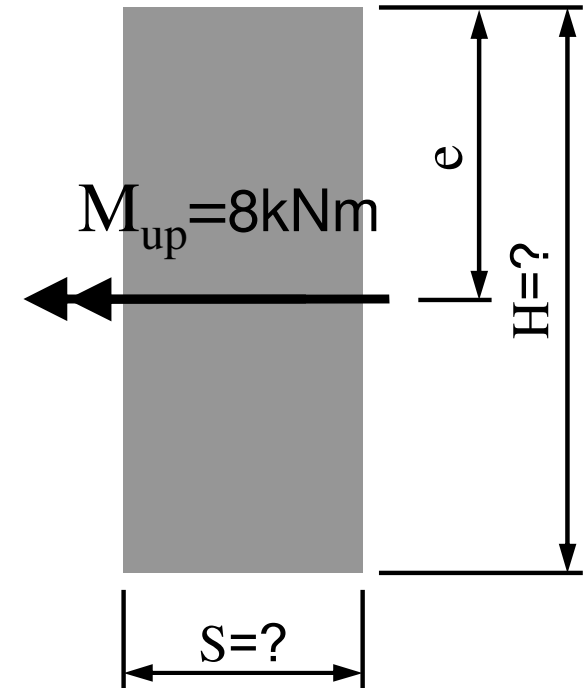


$$\sigma_{xx} = \frac{M_{up} e(H)}{I(S, H)} \leq \sigma_{dop}$$

$$I(S, H) = \frac{S H^3}{12}, \quad e(H) = \frac{H}{2}$$

$$\rho A(S, H) L_{nosilec} = m_{nosilec}$$

$$A(S, H) = S H$$



$$L_{nosilec} = 2 \text{ m}$$

$$m_{nosilec} = 50 \text{ kg}$$

$$\sigma_{dop} = 100 \text{ MPa}$$

$$\rho = 7800 \text{ kg/m}^3$$

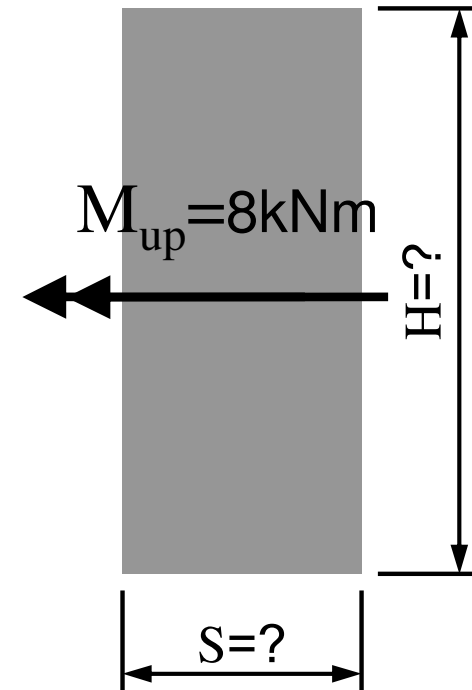
## 10-2. naloga: določite dimenzije pravokotnega prereza

Rešite sistem nelinearnih enačb  
po Newton-ovi metodi:

$$f_H(S, H) = H - \frac{m_{\text{nosilec}}}{L_{\text{nosilec}} \rho S} = H - \frac{K_1}{S} = 0$$

$$f_S(S, H) = S - \frac{6 M_{\text{up}}}{\sigma_{\text{dop}} H^2} = S - \frac{K_2}{H^2} = 0$$

$$H = ? , S = ?$$



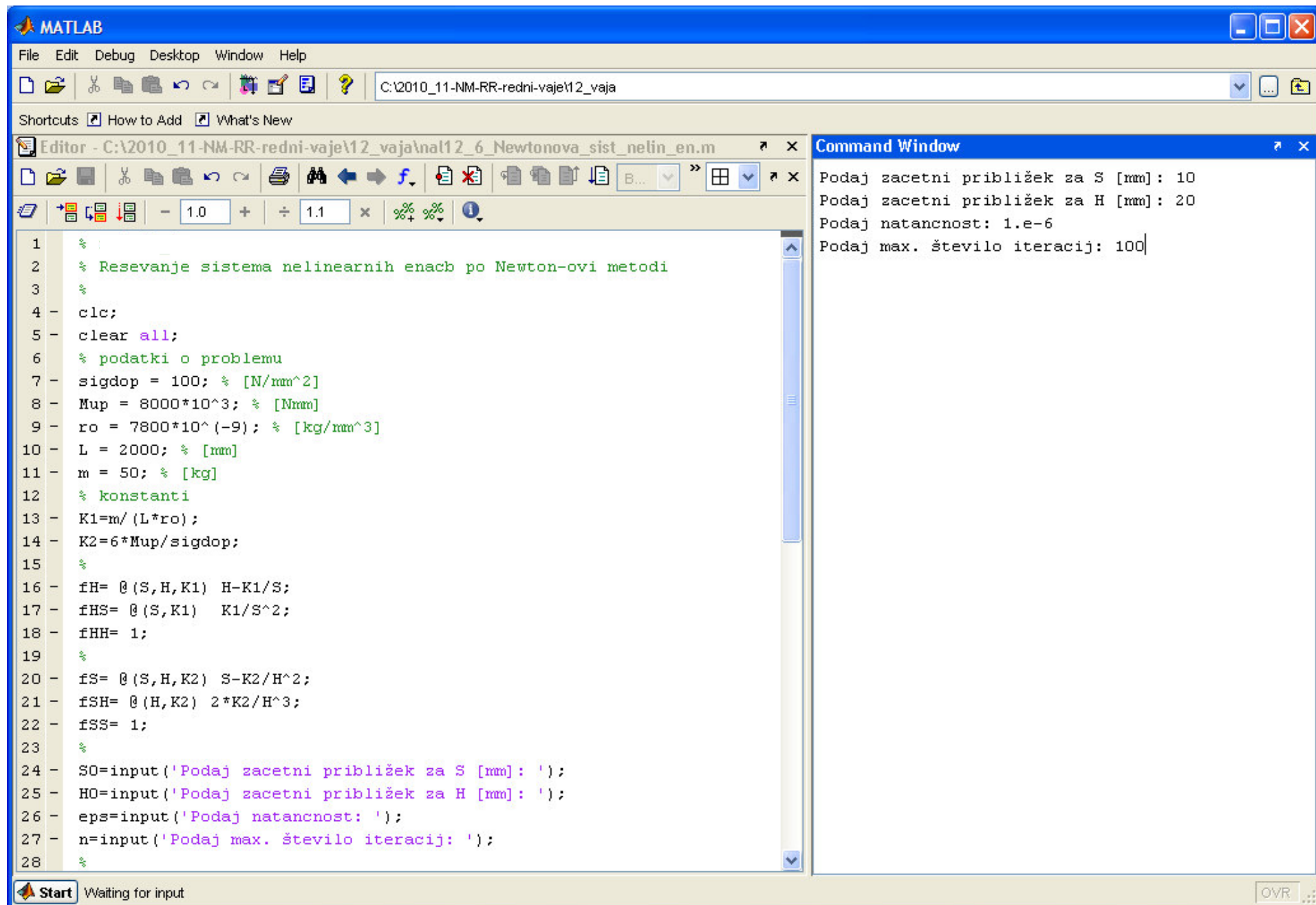
$$L_{\text{nosilec}} = 2 \text{ m}$$

$$m_{\text{nosilec}} = 50 \text{ kg}$$

$$\sigma_{\text{dop}} = 100 \text{ MPa}$$

$$\rho = 7800 \text{ kg/m}^3$$

## 10-2. naloga: določite dimenzije pravokotnega prereza



The image shows the MATLAB environment with a script editor and a command window. The script editor contains the following code:

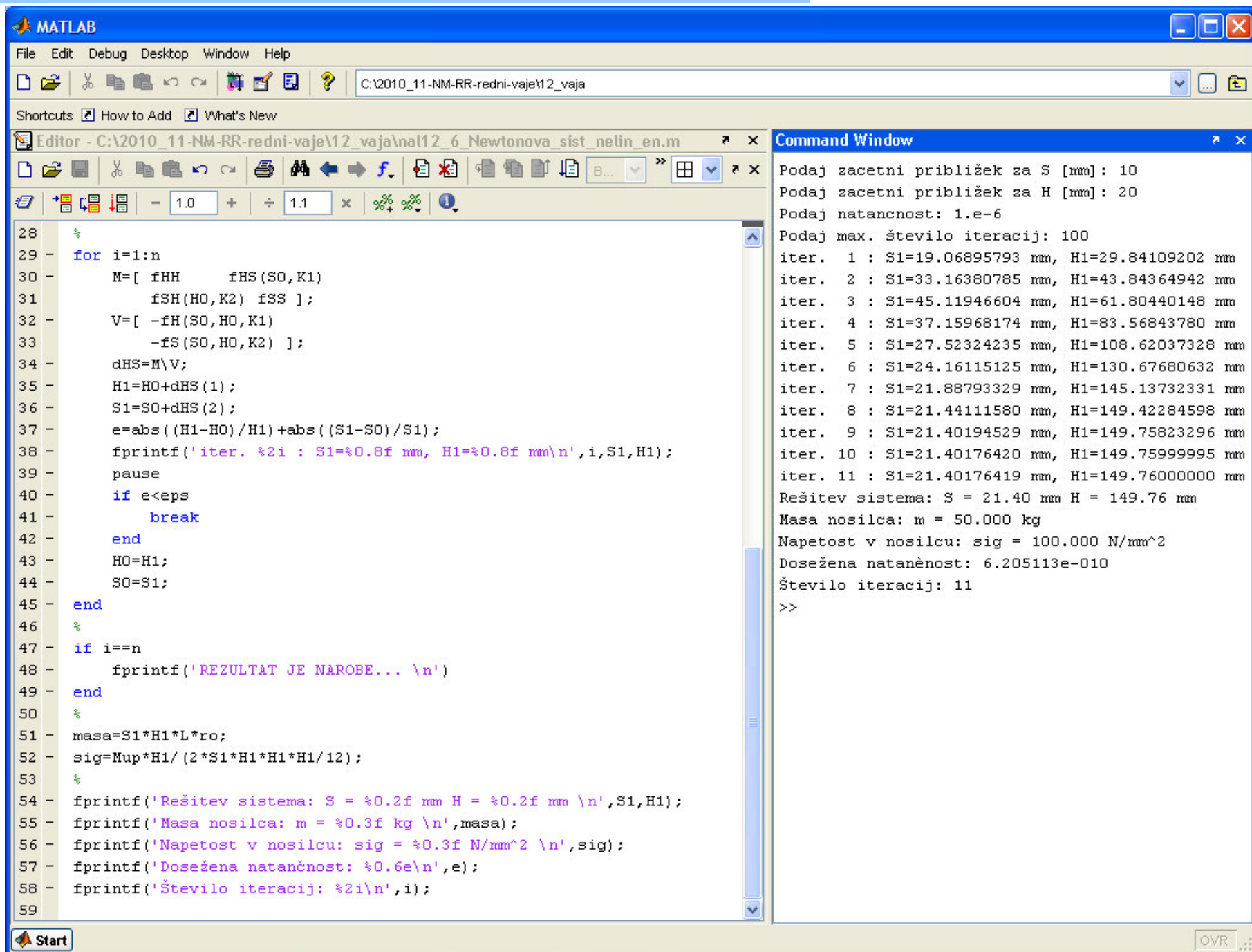
```
1 %  
2 % Resevanje sistema nelinearnih enač po Newton-ovi metodi  
3 %  
4 - clc;  
5 - clear all;  
6 % podatki o problemu  
7 - sigdop = 100; % [N/mm^2]  
8 - Mup = 8000*10^3; % [Nmm]  
9 - ro = 7800*10^(-9); % [kg/mm^3]  
10 - L = 2000; % [mm]  
11 - m = 50; % [kg]  
12 % konstanti  
13 - K1=m/(L*ro);  
14 - K2=6*Mup/sigdop;  
15 %  
16 - fH= @(S,H,K1) H-K1/S;  
17 - fHS= @(S,K1) K1/S^2;  
18 - fHH= 1;  
19 %  
20 - fS= @(S,H,K2) S-K2/H^2;  
21 - fSH= @(H,K2) 2*K2/H^3;  
22 - fSS= 1;  
23 %  
24 - S0=input('Podaj zacetni priblizek za S [mm]: ');  
25 - H0=input('Podaj zacetni priblizek za H [mm]: ');  
26 - eps=input('Podaj natancnost: ');  
27 - n=input('Podaj max. stevilo iteracij: ');  
28 %
```

The Command Window shows the following user input:

```
Podaj zacetni priblizek za S [mm]: 10  
Podaj zacetni priblizek za H [mm]: 20  
Podaj natancnost: 1.e-6  
Podaj max. stevilo iteracij: 100
```

The status bar at the bottom left indicates "Start" and "Waiting for input". The status bar at the bottom right shows "OVR".

## 10-2. naloga: določite dimenzije pravokotnega prereza



The image shows a MATLAB environment with an Editor window and a Command Window. The Editor window contains a script for solving a system of equations using the Newton-Raphson method. The Command Window displays the execution results, including the initial values, iteration process, and final solution.

```
28 %
29 - for i=1:n
30 -     M=[ fHH      fHS(SO,K1)
31 -         fSH(HO,K2) fSS ];
32 -     V=[ -fH(SO,HO,K1)
33 -         -fS(SO,HO,K2) ];
34 -     dHS=M\V;
35 -     H1=HO+dHS(1);
36 -     S1=SO+dHS(2);
37 -     e=abs((H1-HO)/H1)+abs((S1-SO)/S1);
38 -     fprintf('iter. %2i : S1=%0.8f mm, H1=%0.8f mm\n',i,S1,H1);
39 -     pause
40 -     if e<eps
41 -         break
42 -     end
43 -     HO=H1;
44 -     SO=S1;
45 - end
46 %
47 - if i==n
48 -     fprintf('REZULTAT JE NAROBE... \n')
49 - end
50 %
51 - masa=S1*H1*L*ro;
52 - sig=Mup*H1/(2*S1*H1*H1*H1/12);
53 %
54 - fprintf('Rešitev sistema: S = %0.2f mm H = %0.2f mm \n',S1,H1);
55 - fprintf('Masa nosilca: m = %0.3f kg \n',masa);
56 - fprintf('Napetost v nosilcu: sig = %0.3f N/mm^2 \n',sig);
57 - fprintf('Dosežena natančnost: %0.6e\n',e);
58 - fprintf('Število iteracij: %2i\n',i);
59
```

Command Window Output:

```
Podaj zacetni približek za S [mm]: 10
Podaj zacetni približek za H [mm]: 20
Podaj natančnost: 1.e-6
Podaj max. število iteracij: 100
iter.  1 : S1=19.06895793 mm, H1=29.84109202 mm
iter.  2 : S1=33.16380785 mm, H1=43.84364942 mm
iter.  3 : S1=45.11946604 mm, H1=61.80440148 mm
iter.  4 : S1=37.15968174 mm, H1=83.56843780 mm
iter.  5 : S1=27.52324235 mm, H1=108.62037328 mm
iter.  6 : S1=24.16115125 mm, H1=130.67680632 mm
iter.  7 : S1=21.88793329 mm, H1=145.13732331 mm
iter.  8 : S1=21.44111580 mm, H1=149.42284598 mm
iter.  9 : S1=21.40194529 mm, H1=149.75823296 mm
iter. 10 : S1=21.40176420 mm, H1=149.75999995 mm
iter. 11 : S1=21.40176419 mm, H1=149.76000000 mm
Rešitev sistema: S = 21.40 mm H = 149.76 mm
Masa nosilca: m = 50.000 kg
Napetost v nosilcu: sig = 100.000 N/mm^2
Dosežena natančnost: 6.205113e-010
Število iteracij: 11
>>
```