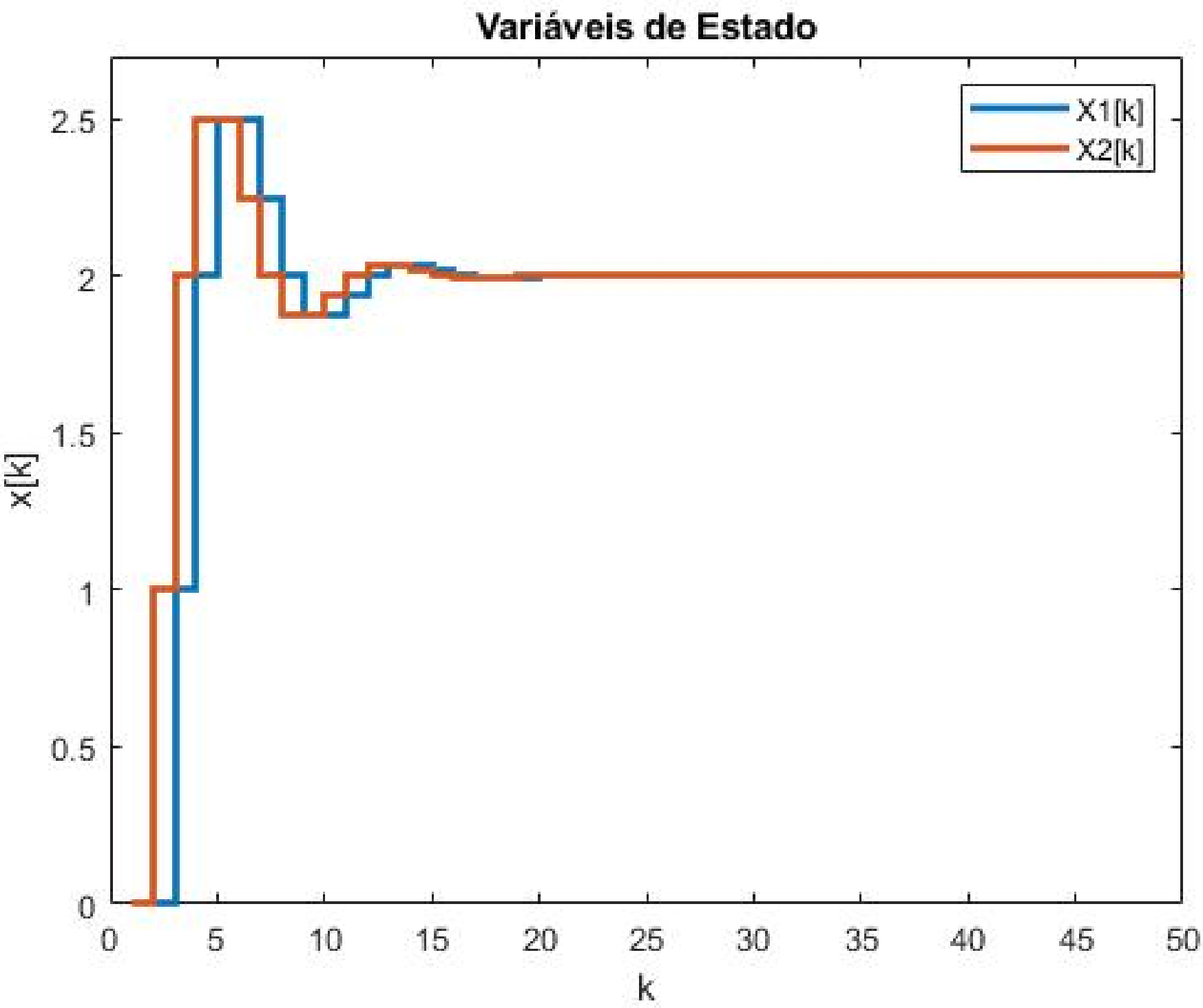
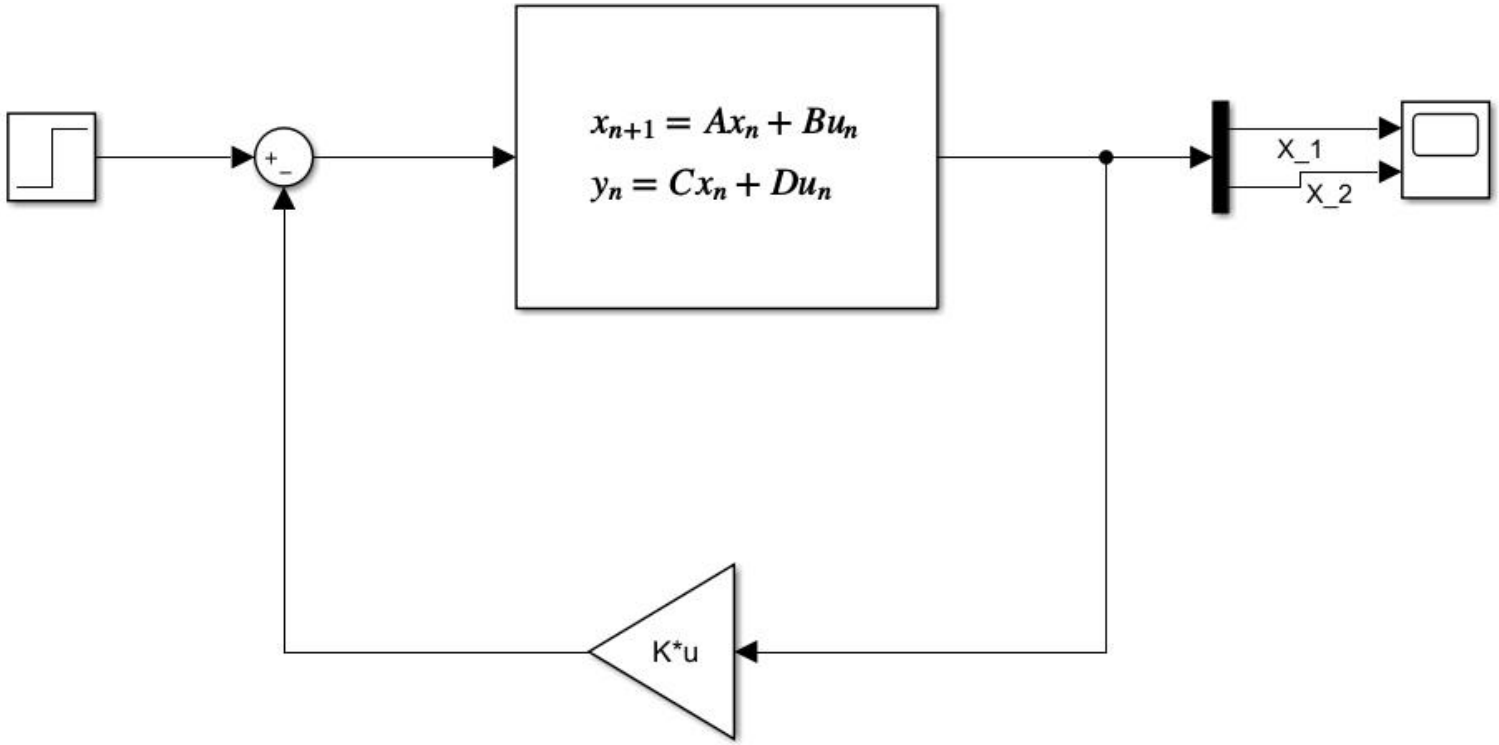
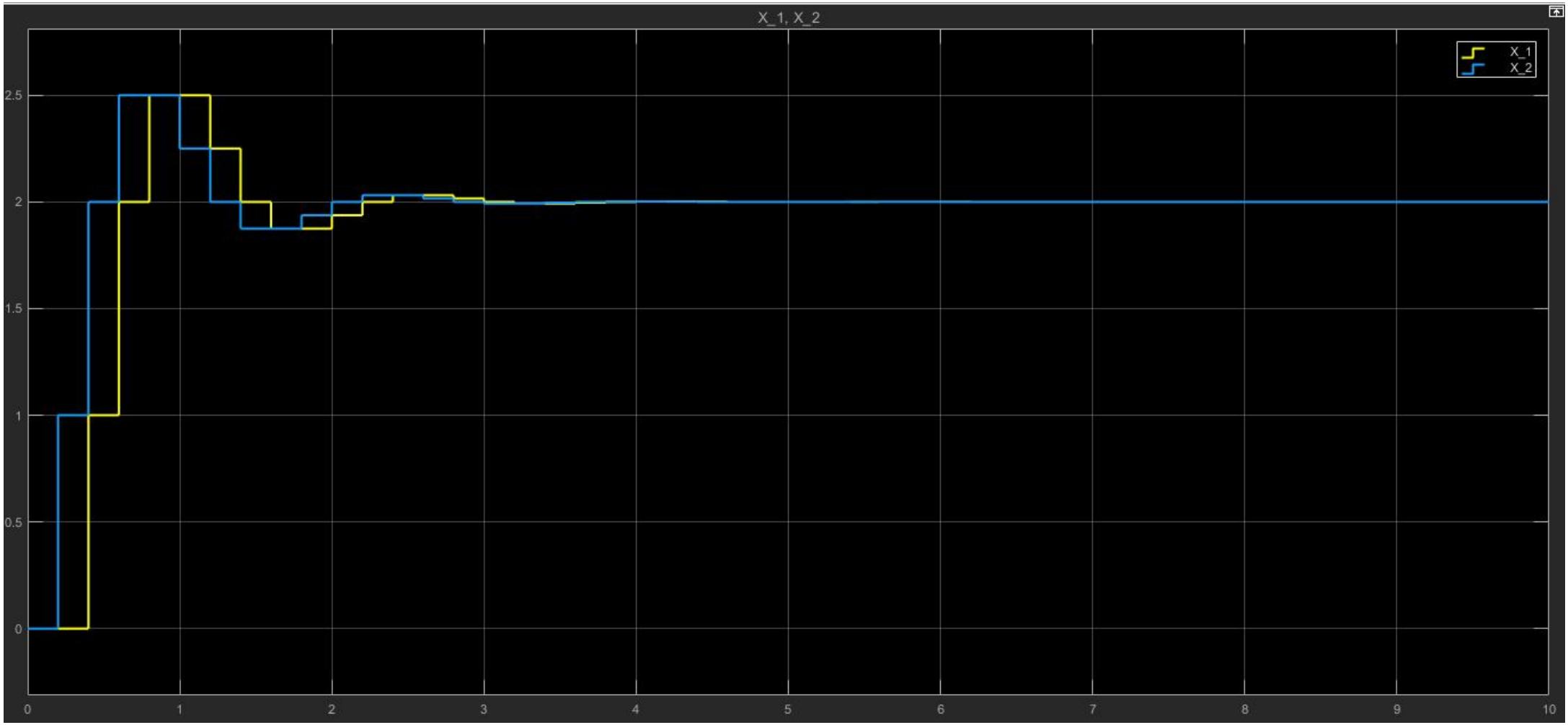
2) Método 1

```
5 -    G = [0 1; -.16 -1];
6 -    H = [0; 1];
7 -    C = [1 0];
8
9 -    F_cc = [.34 -2];                          % Matriz realimentação na FCC
10 -   P = [H G*H]*[1 1;1 0];                    % P = C_cal*T
11 -   F = F_cc/P;                               % F = F_cc*P^-1
12 -   x = zeros(2,51);
13 -     for k = 1:50
14 -         x(:,k+1) = (G-H*F)*x(:,k)+H;       % Calcula x[k+1]
15 -     end
16
17 -   k = linspace(1,51,51);
18 -   figure
19 -   mostra(k,x(1,k),'k','x[k]','r',0,2.7);                    %mostra x1
20 -   mostra(k,x(2,k),'k','x[k]','Variáveis de Estado',0,2.7);  %mostra x2 no
21 -   legend('X1[k]','X2[k]');                                  %mesmo grafico
22
23     function mostra(k,x,xl,yl,Title,a,b)
24 -       stairs(k,x,'LineWidth',2);
25 -       hold on
26 -       title(Title);
27 -       xlabel(xl)
28 -       ylabel(yl)
29 -       ylim([a b])
30 -       xlim([0 50])
31 -   end
```


Variáveis de Estado
X1[k]
X2[k]
x[k]
k
0
0.5
1
1.5
2
2.5
0
5
10
15
20
25
30
35
40
45
50

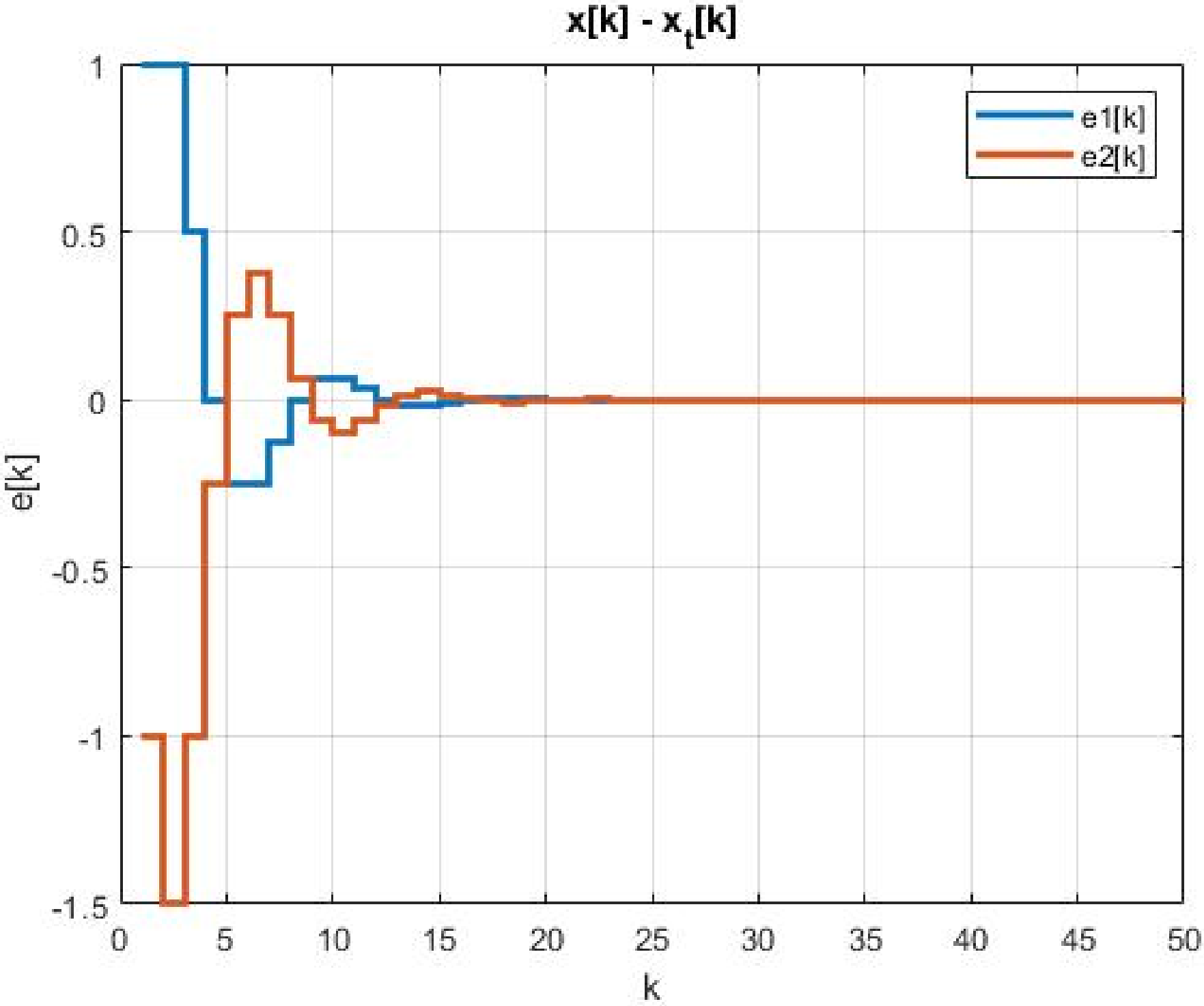
Método 2



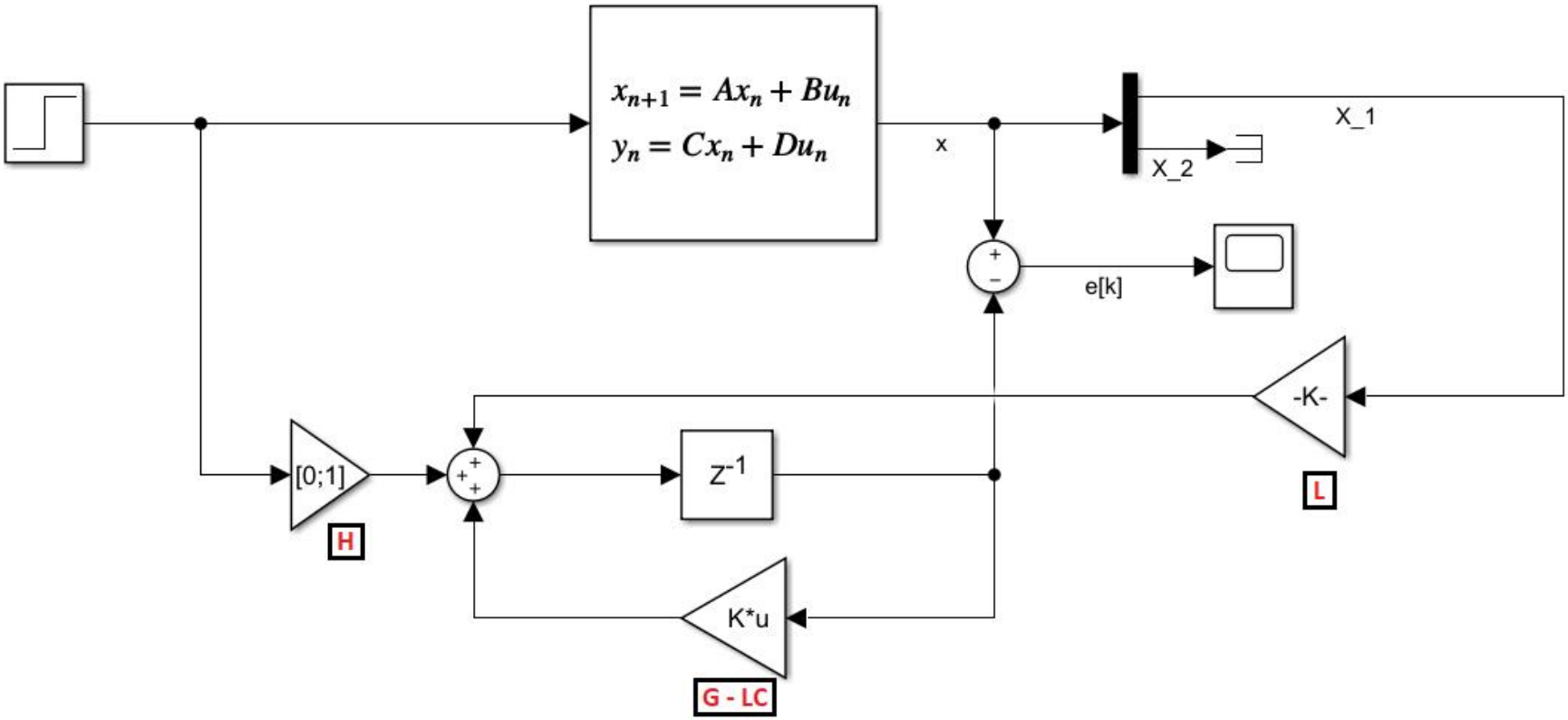

X_1, X_2
X_1
X_2
2.5
2
1.5
1
0.5
0
0
1
2
3
4
5
6
7
8
9
10

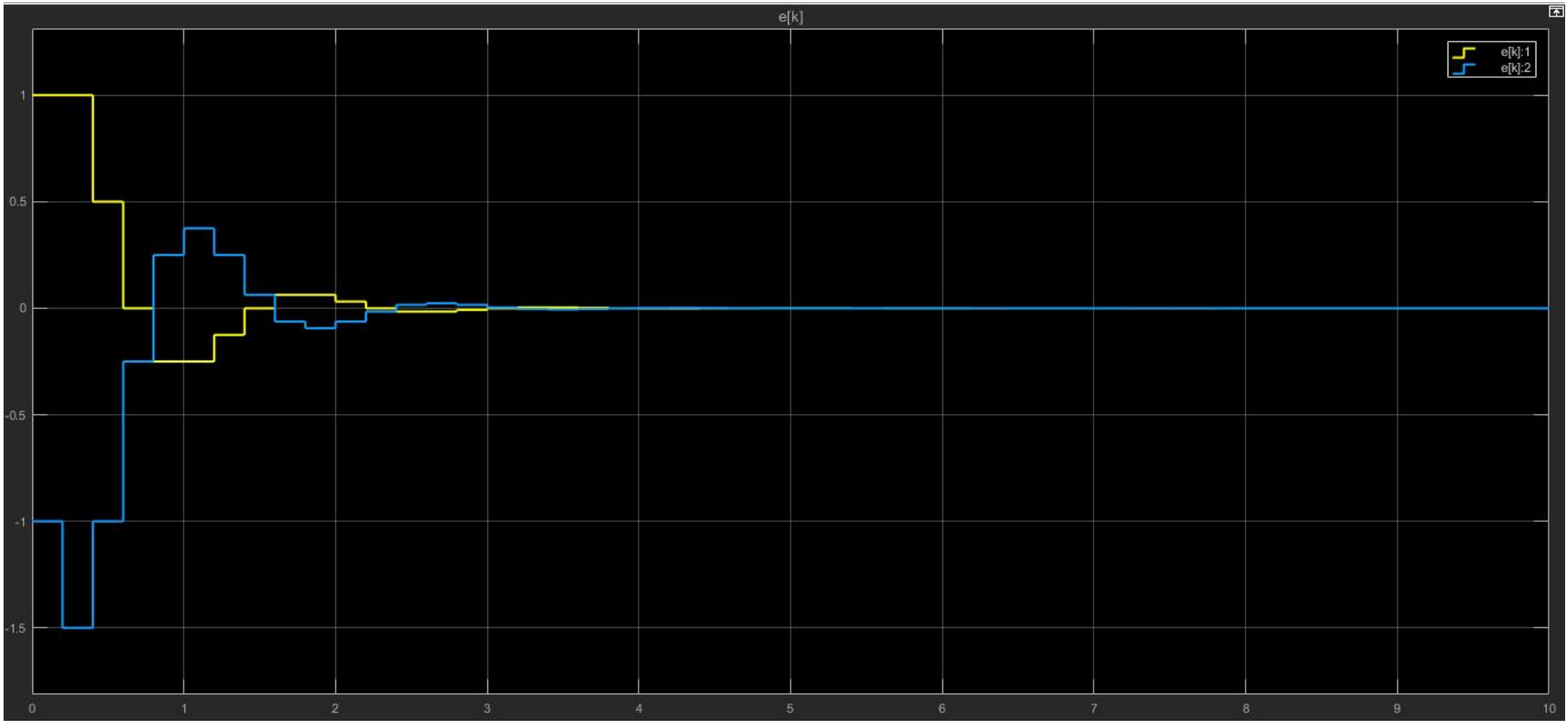
4) Método 1

```
clear
close all
clc
%Dados
G = [0 1; -.16 -1];
H = [0; 1];
C = [1 0];

L = [-2; 2.34];
%Estados
x = zeros(2,51);
x(1,1) = 1;          % x1[0] = 1
x(2,1) = -1;         % x2[0] = -1
x_t = zeros(2,51);   % Observador

for k = 1:50
      x(:,k+1) = G*x(:,k)+H;                          %x[k+1]
      x_t(:,k+1) = (G-L*C)*x_t(:,k)+H+L*C*x(:,k);     %x_t[k+1]
end

k = linspace(1,31,31);
e = x - x_t;         %erro
figure
mostra(k,e(1,k),'k','e[k]','r',-1,1);          %mostra x1
mostra(k,e(2,k),'k','e[k]','Erro',-1.5,1);     %mostra x2 no mesmo grafico
legend('e1[k]','e2[k]');
function mostra(k,x,xl,yl,Title,a,b)...
```

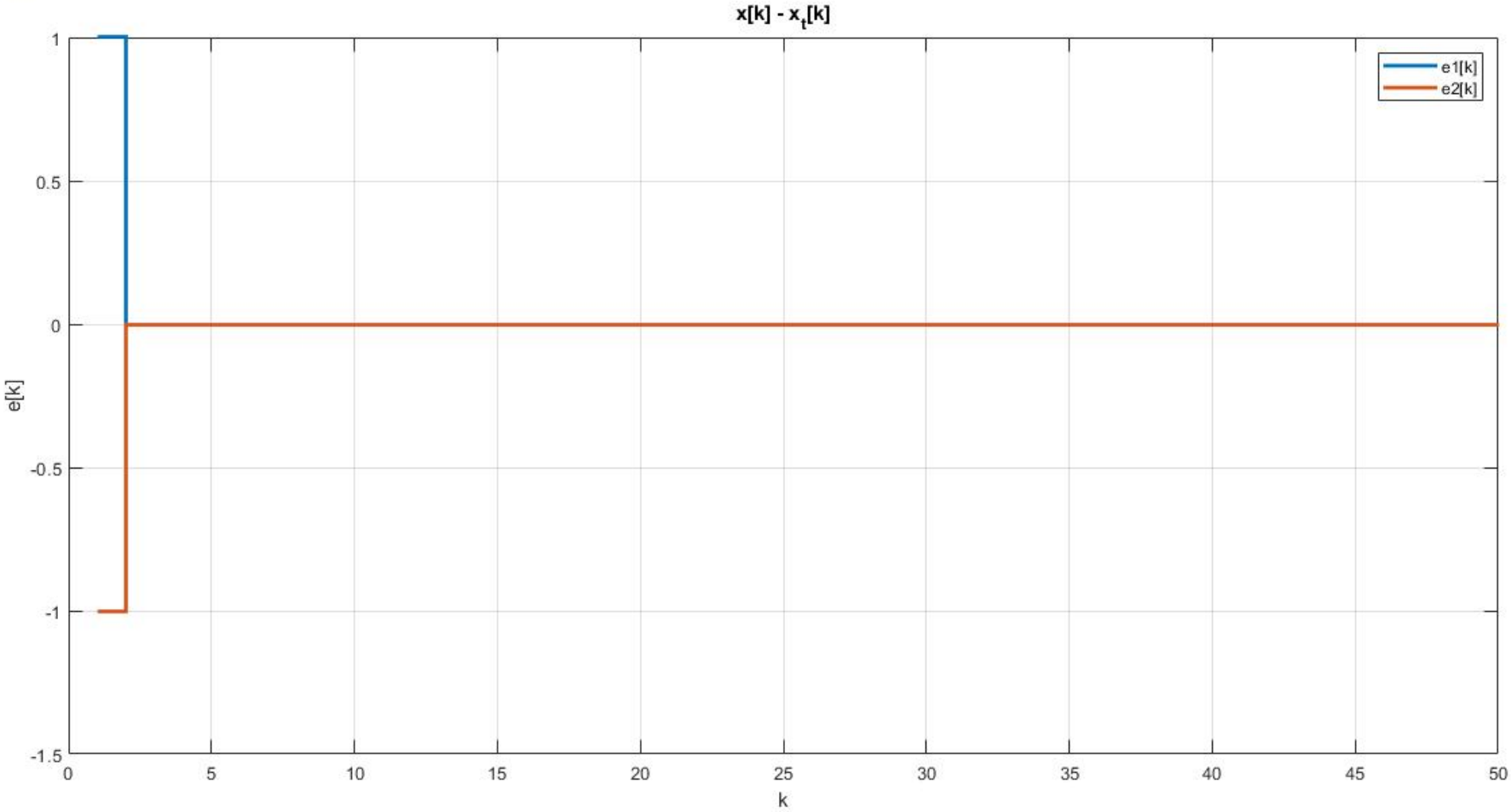

x[k] - x_t[k]
e1[k]
e2[k]
e[k]
k
1
0.5
0
-0.5
-1
-1.5
0
5
10
15
20
25
30
35
40
45
50

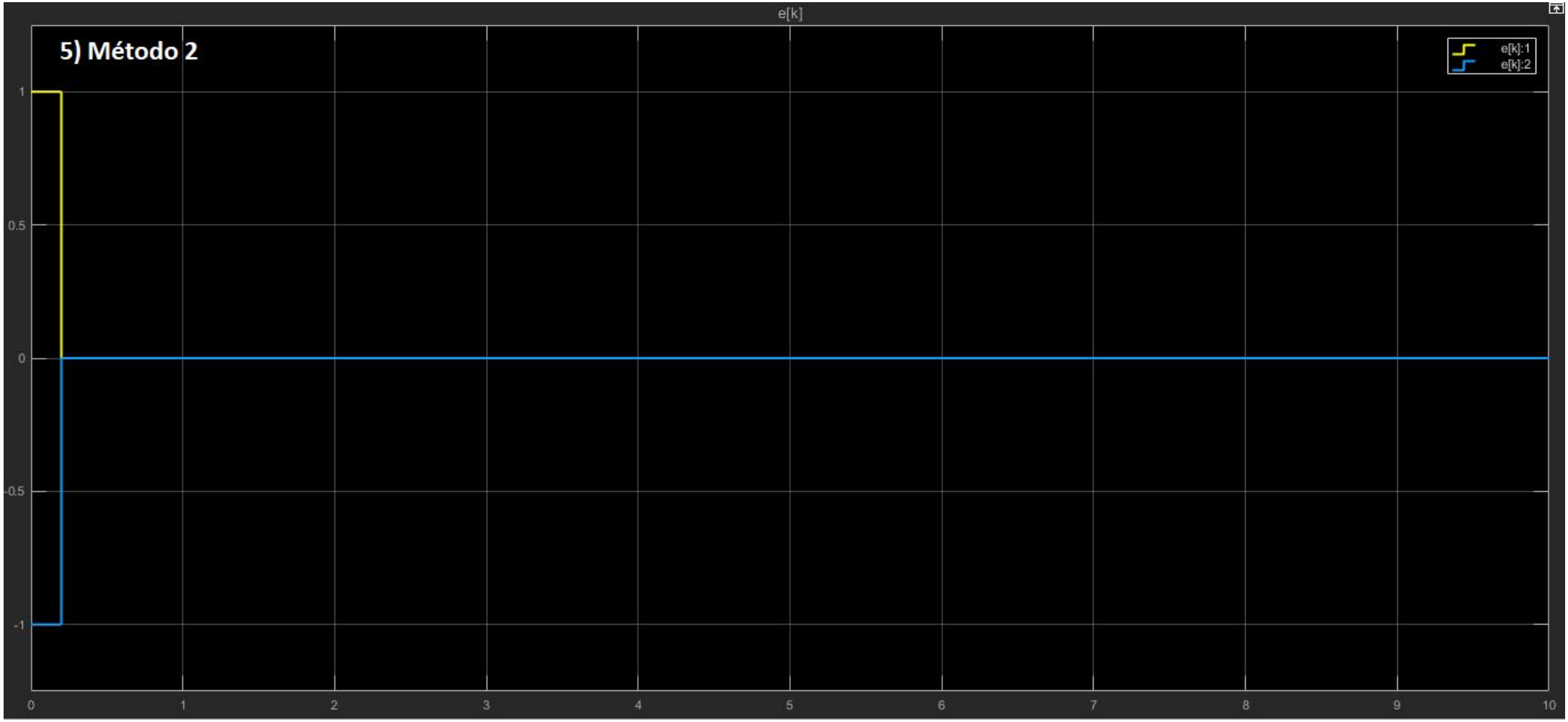
Método 2




e[k]
e[k]:1
e[k]:2
1
0.5
0
-0.5
-1
-1.5
0
1
2
3
4
5
6
7
8
9
10

5) Método 1

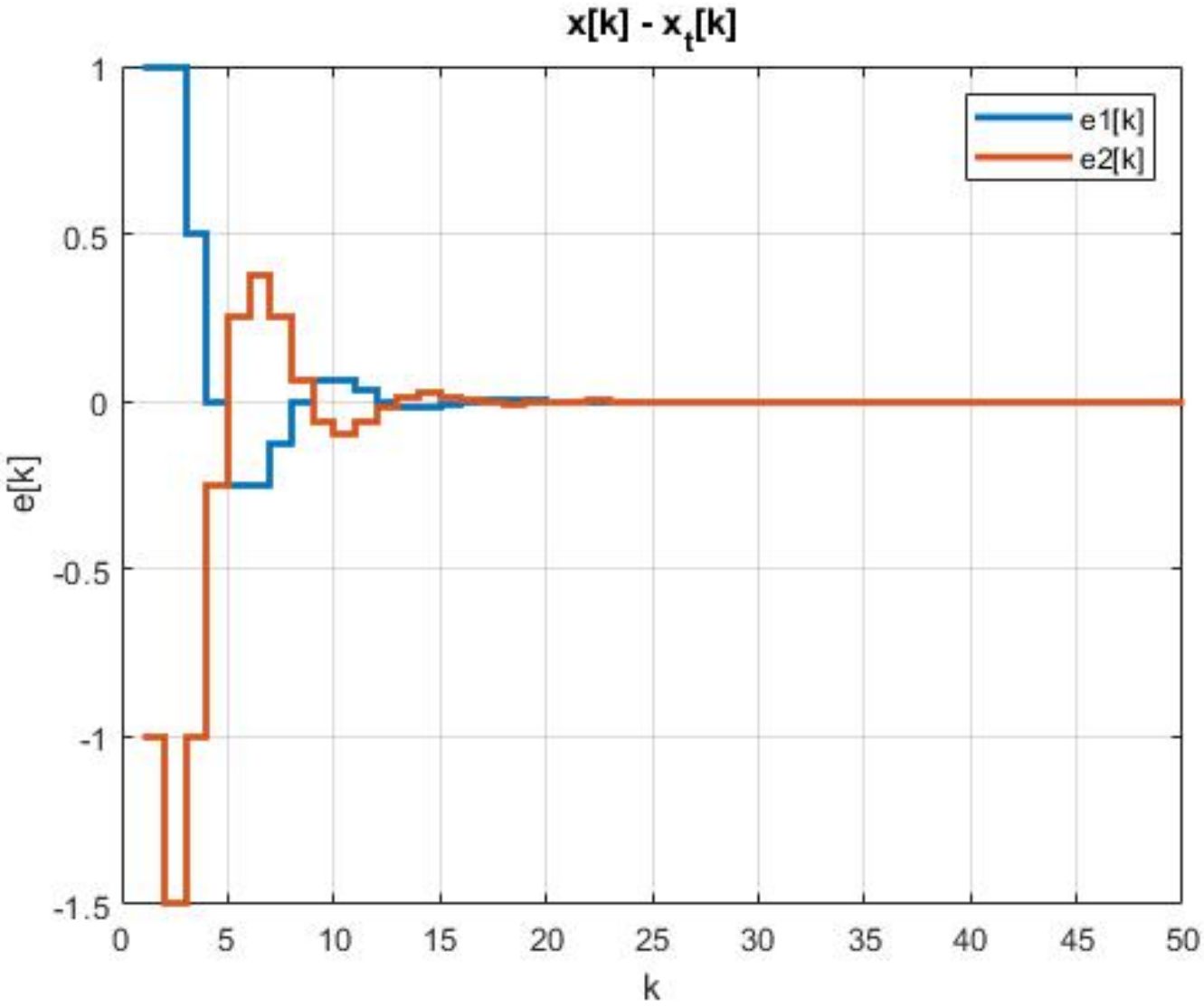



e[k]
5) Método 2
e[k]:1
e[k]:2
1
0.5
0
-0.5
-1
0
1
2
3
4
5
6
7
8
9
10

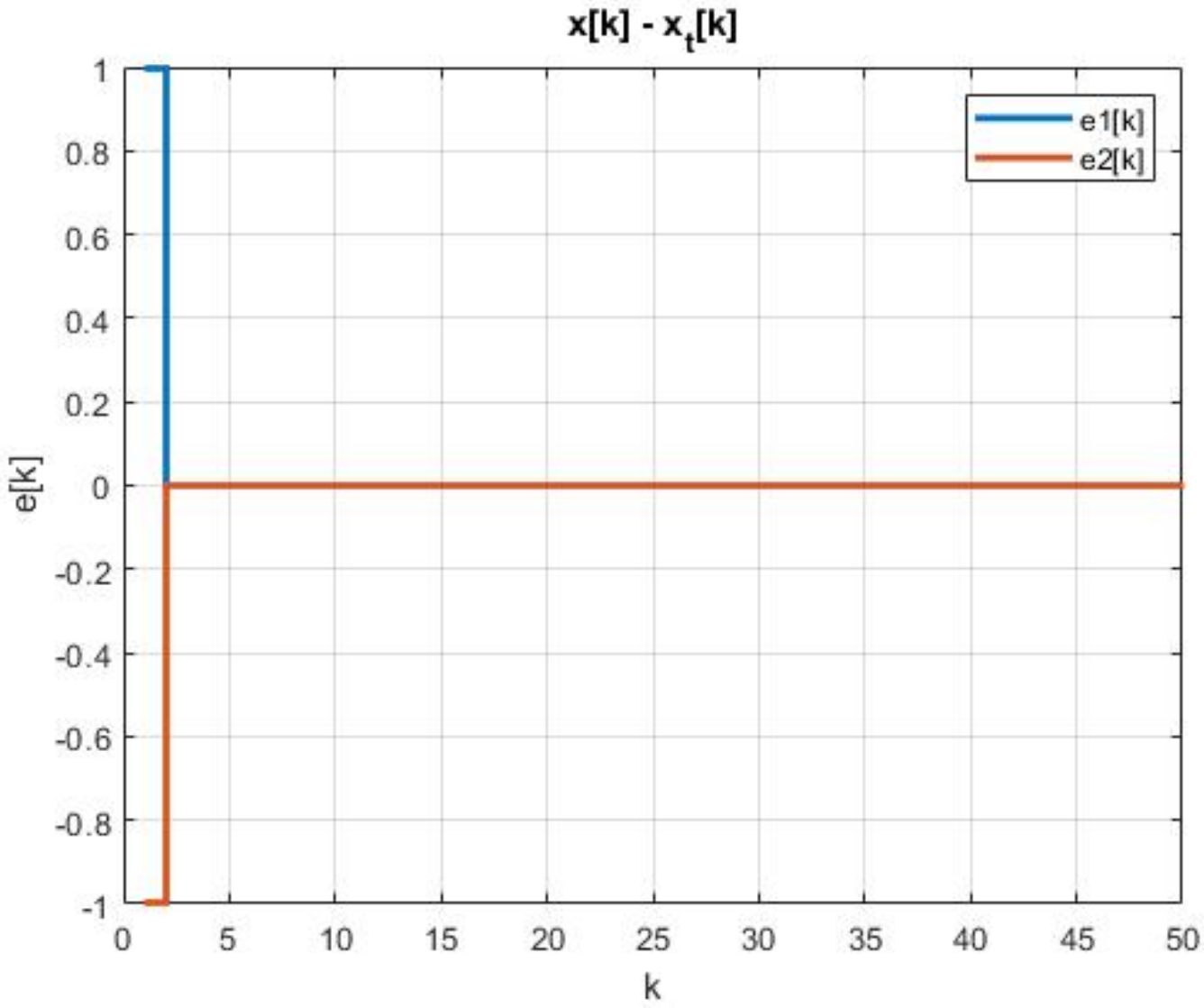
6) Método 1

```
4       %Dados
5 -     G = [0 1; -.16 -1];
6 -     H = [0; 1];
7 -     C = [1 0];
8       %Matrizes
9 -     F = [.34 -2];                %Realimentação
10 -    L = [-2; 2.34];              %Ganho Observador
11      %Estados
12 -    x = zeros(2,51);
13 -    x(1,1) = 1;                 % x1[0] = 1
14 -    x(2,1) = -1;                % x2[0] = -1
15 -    x_t = zeros(2,51);          % Observador
16 -    u = zeros(1,51);
17 -    u(1,1) = 1 - F*x_t(:,1);    % u[0]
18 -    for k = 1:50
19 -          x(:,k+1) = G*x(:,k)+H*u(1,k);                          %x[k+1]
20 -          x_t(:,k+1) = (G-L*C)*x_t(:,k)+H*u(1,k)+L*C*x(:,k);     %x_t[k+1]
21 -          u(1,k+1) = 1-  F*x_t(:,k+1);
22 -    end
23
24 -    k = linspace(1,51,51);
25 -    e = x - x_t;          %erro
26 -    figure
27 -    mostra(k,x(1,k),'k','e[k]','r',-1,1);          %mostra x1
28 -    mostra(k,x(2,k),'k','e[k]','x[k] - x_t[k]',-1.5,10);    %mostra x2 no mesmo grafico
29 -    legend('e1[k]','e2[k]');
30      function mostra(k,x,xl,yl,Title,a,b)...
```

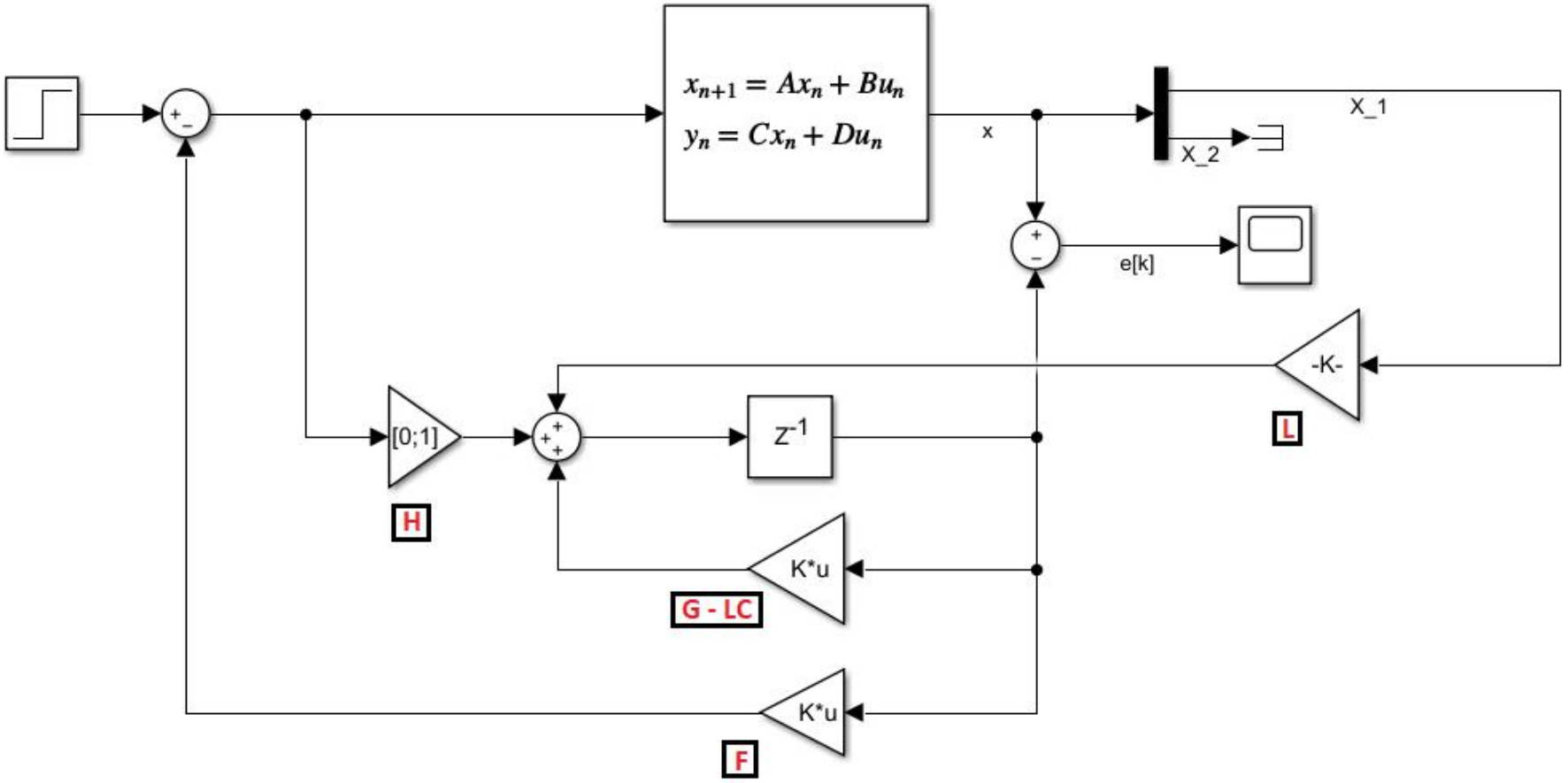
```
L = [-2; 2.34] (Observador item 3)
```

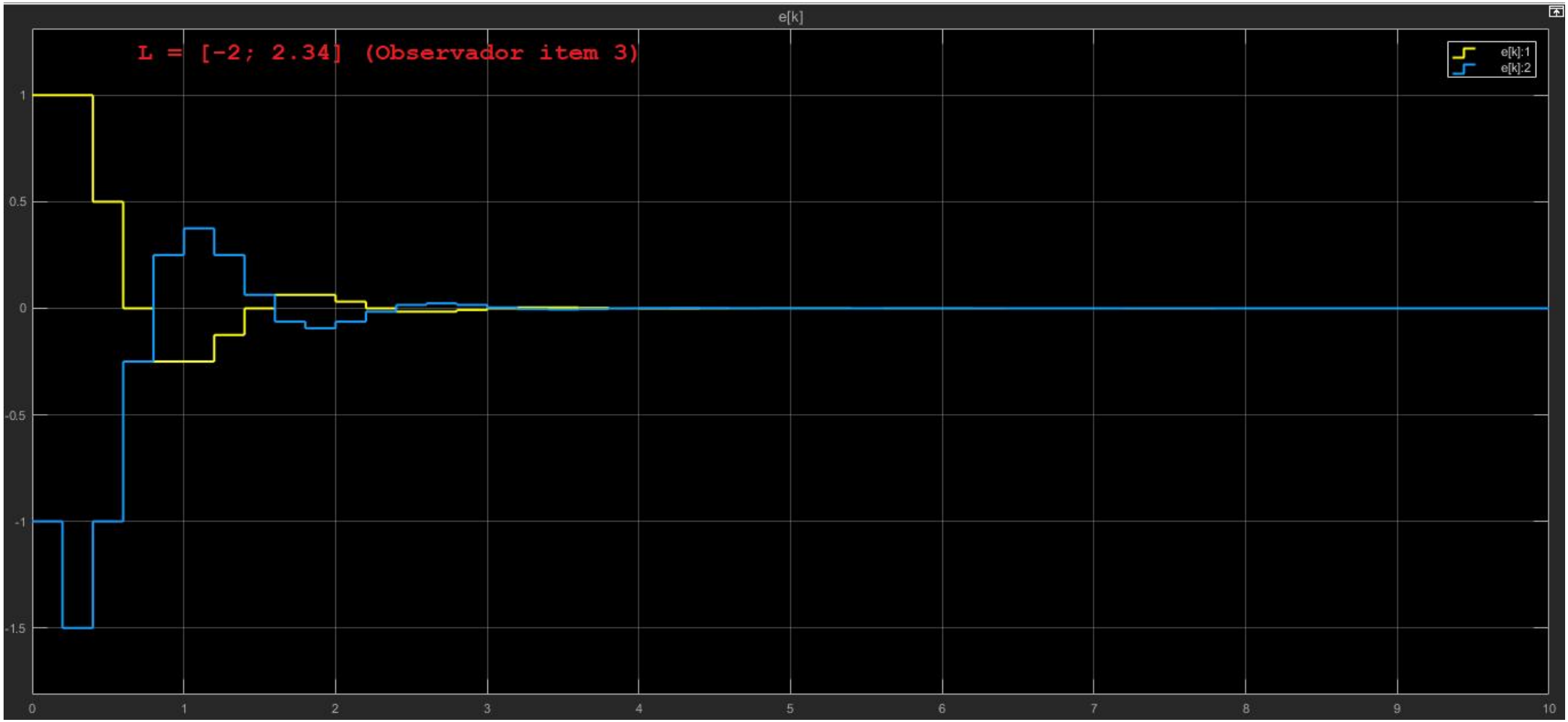


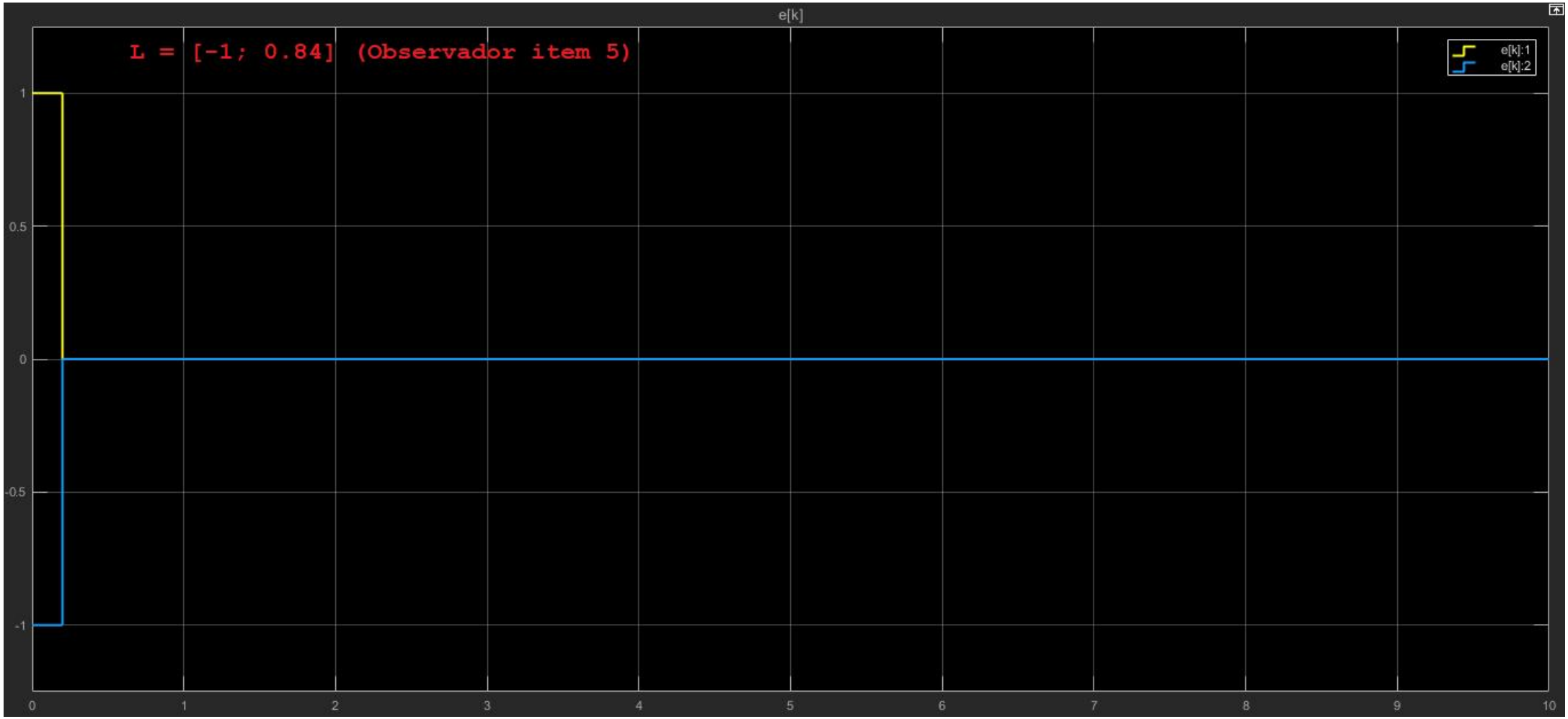
L = [-1; 0.84] (Observador item 5)



Método 2




e[k]
L = [-2; 2.34] (Observador item 3)
e[k]:1
e[k]:2
1
0.5
0
-0.5
-1
-1.5
0
1
2
3
4
5
6
7
8
9
10


e[k]
L = [-1; 0.84] (Observador item 5)
e[k]:1
e[k]:2
1
0.5
0
-0.5
-1
0
1
2
3
4
5
6
7
8
9
10