```matlab
 1 function [tau] = rc_step_bode()
 2 %
 3 % Sprungantwort und Bodediagramm des RC-Tiefpasses
 4 % Mev, 10/2017, 11/2020
 5
 6 %% RC-Tiefpass
 7 %-------------------------------------------------------------------
 8 %R = 1000;            % [Ohm]
 9 %C = 33e-9;           % [F]
10 %tau = R*C;           % [s]    Zeitkonstante
11 %fg = 1/2/pi/(R*C);   % [Hz]   Grenzfrequenz
12
13 freq = [100,500,750,1000,1500,2000,2500,3200,4000,5000,6000,7500,10000,12000,15000
14 G = [1,1,0.99,0.98,0.95,0.92,0.88,0.84,0.78,0.70,0.63,0.55,0.45,0.39,0.31,0.24,0.1
15 R = 1003;            % [Ohm]
16 C = 54.85e-9;        % [F]
17 tau = R*C;           % [s]    Zeitkonstante
18 fg = 5000; % in hz
19 amp = 20*log(G);
20 phi = atand(G);
21
22 % Betrag des Frequenzgangs
23 G_RC = @(w) 1./sqrt(1+(w*tau).^2)
24
25 %% Grafiken
26 %-------------------------------------------------------------------
27 figure(1)
28 set(gcf,'units','normalized','position',[0.3 0.05,0.6,0.85])
29 clf
30
31 %% Sprungantwort
32 %h1 = subplot(2,1,1);
33 %set(h1,'position', [0.08,0.56,0.88,0.4],'fontsize',12);
34 %[u,t] = step(tf(1,[R*C, 1]));          % (Control System Toolbox)
35 %hs = plot(t,u,'linewidth',2);
36 %grid
37 %title('RC-Tiefpass (R = 1 k\Omega , C = 33 nF), Sprungantwort')
38 %hold on
39 %yline(0.63,'k--')
40 %xline(tau,'k--')
41 %ylabel('Spannung u(t) [V]')
42 %xlabel('Zeit [s]')
43 %hold off
44
45 %% Amplitudengangsdiagramm
46 h1 = subplot(2,1,1);
47 set(h1,'position', [0.08,0.56,0.88,0.4]);
48 set(h1,'fontsize',12)
49 Ad = plot(freq,amp,'linewidth', 3);
50 set(h1,'xscale','log');
51 xlabel('Frequenz [Hz]')
52 set(h1,'ylim', [-45 5]);
53 grid on
```

```matlab
54 title('Betragsfrequenzgang passiver RC-Tiefpass')
55 %hold (h1, 'on')
56 %fminmax = get(h1,'xlim');
57 %plot(fminmax,[-3, -3],'k--')
58 %gminmax = get(h1,'ylim');
59 %plot([fg,fg],gminmax,'k--')
60 ylabel('Dämpfung [dB]')
61 %hold (h1, 'off')
62
63 %% Phasenwinkel
64 h2 = subplot(2,1,2);
65 set(h2,'position', [0.08,0.08,0.88,0.4]);
66 set(h2,'fontsize',12)
67 Pw = plot(freq,phi,'linewidth', 3);
68 %get(h2);
69 set(h2,'xscale','log');
70 set(h2,'ylim', [5 50]);
71 ylabel('Phasen winkel [°]')
72 xlabel('Frequenz [Hz]')
73 grid on
74 title('Argument frequenzgang passiver RC-Tiefpass')
75
76 %% Bodediagramm
77 %h2 = subplot(2,1,2);
78 %set(h2,'position', [0.08,0.08,0.88,0.4]);
79 %set(h2,'fontsize',12)
80 %f = logspace(2,5,1000)
81 %hb = semilogx(f, 20*log10(G_RC(2*pi*f)),'linewidth',2);
82 %grid
83 %title('RC-Tiefpass, Betragsfrequenzgang')
84 %hold on
85 %yline(-3,'k--')
86 %xline(fg,'k--')
87 %ylabel('Dämpfung [dB]')
88 %xlabel('Frequenz [Hz]')
89 %hold off
```