Scilab Manual for
Control Systems and Simulation
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Solutions provided by
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http://spoken-tutorial.org/NMEICT-Intro. This Scilab Manual and Scilab codes
written in it can be downloaded from the ”Migrated Labs” section at the website
http://scilab.in
Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Scilab Solutions</td>
<td>3</td>
</tr>
<tr>
<td>1  Linear System Analysis (Time domain analysis, Error analysis)</td>
<td>5</td>
</tr>
<tr>
<td>2  Stability analysis (Bode, Root Locus, Nyquist) of Linear</td>
<td>8</td>
</tr>
<tr>
<td>Time Invariant System</td>
<td></td>
</tr>
<tr>
<td>3  State space model for classical transfer function - Verification</td>
<td>11</td>
</tr>
</tbody>
</table>
List of Experiments

Solution 1.1  Linear System Analysis ....................... 5
Solution 2.2  Stability Analysis ............................ 8
Solution 3.3  Statespace model for Classical transfer function . 11
List of Figures

1.1 Linear System Analysis . . . . . . . . . . . . . . . . . . . . . 7
2.1 Stability Analysis . . . . . . . . . . . . . . . . . . . . . . . . . . . . 9
Experiment: 1

Linear System Analysis (Time domain analysis, Error analysis)

Scilab code Solution 1.1 Linear System Analysis

1 // Created using Ubuntu 14.04 and Scilab 5.5.0
2 // Time Domain Analysis
3 clear
4 num=poly([12.811 18 6.3223],”s”,”coeff”); // Defines the numerator of the transfer function
5 den=poly([12.811 18 11.3223 6 1],”s”,”coeff”); // Defines the denominator of the transfer function
6 sl=syslin(’c’,num,den); // Defines the transfer function
7 t=[0:0.001:25]; // The time of simulation is set from 0 to 25 seconds
8 plot2d(t,csim(’step’,t,sl)) // It plots the step response of the transfer function sl
9 xgrid(5,1,7)
10 xtitle(’Time Domain Analysis’,’Time(sec)’,’C(t)’)
// Error Analysis

clear
clc
num = poly([240 120],"s","coeff"); // Defines the numerator of G(s)
den = poly([12 7 1],"s","coeff"); // Defines the denominator of G(s)
G = num/den; // Defines G(s)
Ess = 1/(1+horner(G,0)); // Evaluates Steady state error for step input
mprintf('The steady state error is ')
disp(Ess)
Figure 1.1: Linear System Analysis
Experiment: 2

Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant System

Scilab code Solution 2.2 Stability Analysis

1 // Created using Ubuntu 14.04 and Scilab 5.5.0
2 // Bode Plot
3 clear
4 num=poly([9 1.8 9],"s","coeff"); // Defines the numerator of G(s)
5 den=poly([0 9 1.2 1],"s","coeff"); // Defines the denominator of G(s)
6 sl=syslin('c',num,den); // Defines G(s)
7 subplot(2,2,1)
8 bode(sl,0.01,100) // It plots the Bode plot from 0.01 Hz to 100 Hz

9
10
11 // Root Locus
12 clear
Figure 2.1: Stability Analysis
13 num=1; // Defines the numerator of G(s)
14 den=poly([0 -1 -2],"s","roots"); // Defines the denominator of G(s)
15 sl=syslin('c',num,den); // Defines G(s)
16 subplot(2,2,2)
17 evans(sl,100) // Plots the root locus for a maximum gain of 100
18 sgrid()

// Nyquist Plot
21 clear
22 num=poly([0.5 1],"s","coeff"); // Defines the numerator of G(s)
23 den=poly([1 0 1 1],"s","coeff"); // Defines the denominator of G(s)
24 sl=syslin('c',num,den); // Defines G(s)
25 subplot(2,2,3)
27 nyquist(sl) // Plots the Nyquist plot for G(s)
Experiment: 3

State space model for classical transfer function - Verification

Scilab code Solution 3.3 Statespace model for Classical transfer function

1  //Created using Ubuntu 14.04 and Scilab 5.5.0
2  clear
3  clc
4  num=poly([10 10],"s","coeff");       //Defines the numerator of the transfer function
5  den=poly([10 5 6 1],"s","coeff");       //Defines the denominator of the transfer function
6  sl=syslin('c',num,den);                 //Defines the transfer function
7  sys=tf2ss(sl);                         //Converts transfer function to space model and stores the result in "sys"
8  disp(sys)