PhD Thesis

My subtitle

by

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Technical Report

at

Miskatonic University

Abstract

Résumé

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Contents

Abstract Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

2.1 Test

A list:

- acronyms NASS MIMO LTI Single-Input Single-Output (SISO)
- glossary terms k_a, ϕ.
- Bibliography citations: [1], [2].

A definition list:

this means that

that means this

Some Footnote[1]

[1] this is a footnote with citation [2].

2.2 Section

2.2.1 Sub section

This is a sub section.

2.2.2 Sub section

Start of the sub section

Paragraph This is a paragraph

lksdfjasd

lksdfjasd

2.3 blabla

3. Source Blocks

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3.1 Figures

```
t = 0:0.01:5; % Time [s]
x = sin(2*pi*t); % Output Voltage [V]

figure;
plot(t, x);
xlabel('Time [s]'); ylabel('Voltage [V]');
```

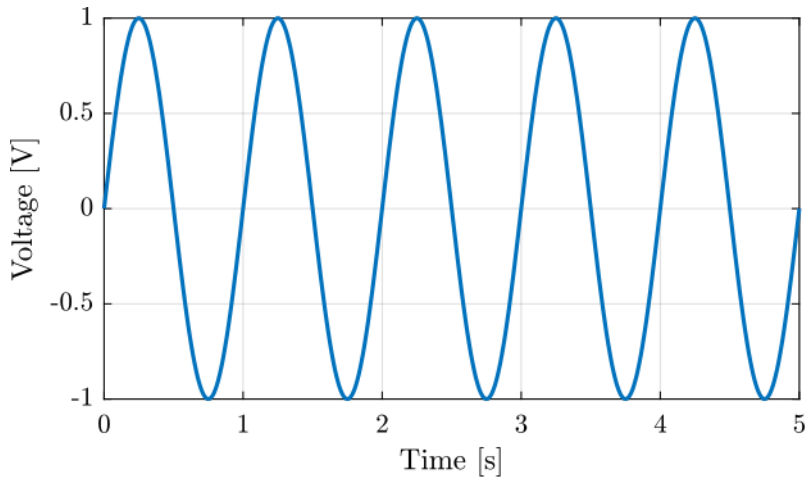


Figure 3.1.: Matlab Figure

3.2 Table Result

```
x = 1:10;
y = x.^2;
```

Table 3.1.: Table caption

x	$y = x^2$
1	1
2	4
3	9
4	16
5	25
6	36
7	49
8	64
9	81
10	100

3.3 Inline Results

Results can be automatically outputed as shown below.

```
sqrt(2)
```

```
1.4142
```

```
y
```

```
y =

     1     4     9    16    25    36    49    64    81   100
```

3.4 Caption and Reference

Captions can be added to code blocks. Moreover, we can link to specific bode blocks (Listing 1 or 2).

```
figure;
[X,Y,Z] = peaks;
contour(X,Y,Z,20)
```

Code Snippet 1: Code to produce a nice contour plot

```
A = [1 2; 3 4; 5 6; 7 8]
[U,S,V] = svd(A)
```

Code Snippet 2: Code to compute the Singular Value Decomposition

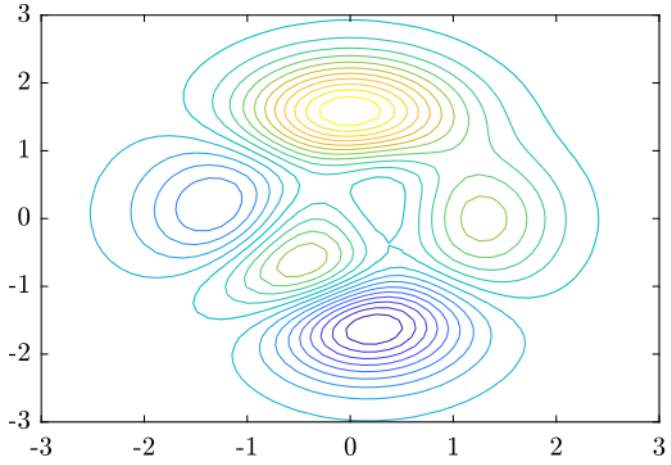


Figure 3.2.: Obtained Contour Plot

```
A = [1 2; 3 4; 5 6; 7 8]
A =
     1     2
     3     4
     5     6
     7     8
[U,S,V] = svd(A)
U =
        -0.152483233310201         -0.82264747222566         -0.394501022283829         -0.379959133877596
        -0.349918371807964         -0.42137528768458          0.242796545704357          0.800655879510063
        -0.547353510305727        -0.0201031031435029          0.697909975442776         -0.461434357387336
         -0.74478864880349          0.381169081397575         -0.546205498863303         0.0407376117548695
S =
          14.2690954992615                          0
                         0          0.626828232417541
                         0                          0
                         0                          0
V =
        -0.641423027995072          0.767187395072177
        -0.767187395072177         -0.641423027995072
```

3.5 Source Blocks with Line Numbers

Citation [1], [3]

The Listing 3 has line numbers as the `-n` option was used.

Specific lines of codes can be referenced. For instance, the code used to specify the wanted the vertical label is on line 4.

```
figure;
plot(t, x)
xlabel('Time [s]');
ylabel('Output [V]');
```

Code Snippet 3: Specify Labels

Numbering can be continued by using `+n` option as shown below.

```
figure;
plot(t, u)
xlabel('Time [s]');
ylabel('Input [V]');
```

4. Images

Contents

4.1 Normal Image

Figure 4.1 shows the results of the Tikz code of listing 4.

```
\begin{tikzpicture}

  % Blocs
  \node[block={2.0cm}{2.0cm}] (P) {$P$};
  \node[block={1.5cm}{1.5cm}, below=0.7 of P] (K) {$K$};

  % Input and outputs coordinates
  \coordinate[] (inputw)  at ($(P.south west)!0.75!(P.north west)$);
  \coordinate[] (inputu)  at ($(P.south west)!0.25!(P.north west)$);
  \coordinate[] (outputz) at ($(P.south east)!0.75!(P.north east)$);
  \coordinate[] (outputv) at ($(P.south east)!0.25!(P.north east)$);

  % Connections and labels
  \draw[<-] (inputw) -- ++(-1.5, 0);
  \draw[<-] (inputu) -- ++(-0.8, 0) |- (K.west);

  \draw[->] (outputz) -- ++(1.5, 0);
  \draw[->] (outputv) -- ++(0.8, 0) |- (K.east);
\end{tikzpicture}
```

Code Snippet 4: Tikz code that is used to generate Figure 4.1

4.2 Sub Images

Link to subfigure 4.2a.

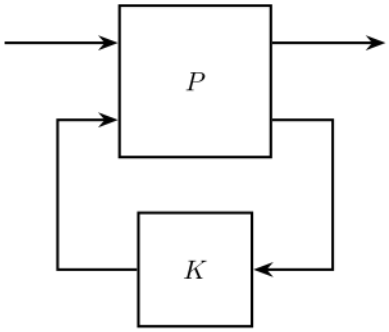
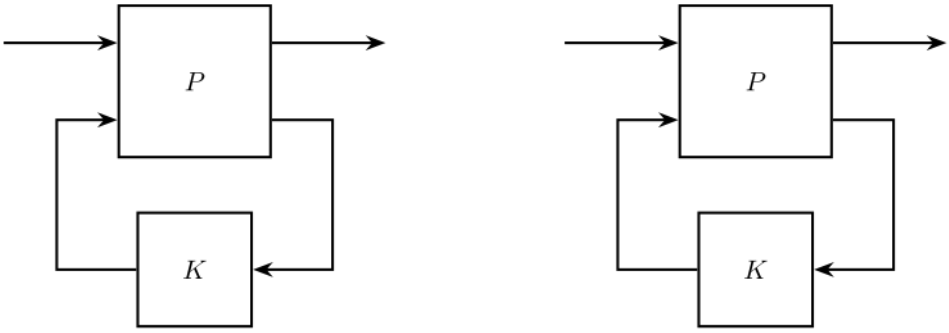


Figure 4.1.: General Control Configuration



(a) sub figure caption (b) sub figure caption

Figure 4.2.: Subfigure Caption

5. Tables

Table 5.1 shows a table with some mathematics inside.

Table 5.1.: A Simple table with included math

N	N^2	N^3	N^4	$\sqrt{n}$	$\sqrt[4]{N}$
1	1	1	1	1	1
2	4	8	16	1.4142136	1.1892071
3	9	27	81	1.7320508	1.3160740

Table 5.2.: Table without Head

	1	**2**	**3**	**4**	**5**
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Table 5.3.: Table with multiples groups

	Classical Control	**Modern Control**
Date	1930-	1960-
Tools	Transfer Functions Nyquist Plots Bode Plots Phase and Gain margins	State Space formulation Riccati Equations
Control Architectures	Proportional, Integral, Derivative Leads, Lags	Full State Feedback LQR, LQG Kalman Filters
Advantages	Study Stability Simple Natural	Automatic Synthesis MIMO Optimization Problem
Disadvantages	Manual Method Only SISO	No Guaranteed Robustness Difficult Rejection of Perturbations

Appendix A.

Mathematical formulas

Appendix B.

Comments on something

Bibliography

[1] T. Dehaeze and C. Collette, "Active damping of rotating platforms using integral force feedback," *Engineering Research Express*, Feb. 2021 (cit. on pp. 17, 22).

[2] T. Dehaeze, J. Bonnefoy, and C. Collette, "Mechatronics approach for the development of a nano-active-stabilization-system," in *MEDSI'20*, (Chicago, USA), ser. Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation, JACoW Publishing, 2021 (cit. on p. 17).

[3] H. Taghirad, *Parallel robots : mechanics and control*. Boca Raton, FL: CRC Press, 2013 (cit. on p. 22).

List of Publications

Articles

T. Dehaeze and C. Collette, "Active damping of rotating platforms using integral force feedback," *Engineering Research Express*, Feb. 2021.

In Proceedings

P. Brumund and T. Dehaeze, "Multibody simulations with reduced order flexible bodies obtained by fea," in *MEDSI'20*, (Chicago, USA), ser. Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation, JACoW Publishing, 2020.

T. Dehaeze, J. Bonnefoy, and C. Collette, "Mechatronics approach for the development of a nano-active-stabilization-system," in *MEDSI'20*, (Chicago, USA), ser. Mechanical Engineering Design of Synchrotron Radiation Equipment and Instrumentation, JACoW Publishing, 2021.

Acronyms

Notation	Description
LTI	Linear Time Invariant
MIMO	Multiple-Inputs Multiple-Outputs
NASS	Nano Active Stabilization System
SISO	Single-Input Single-Output

Glossary

Notation	Description
ϕ	A woody bush
k_a	Actuator Stiffness in