Writing a Thesis or Dissertation for University of Idaho with LaTeX

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University of Idaho ▪ Idaho Falls Center for Higher Education
Department of Nuclear Engineering and Industrial Management

December 6th, 2023

University of Idaho
Department of Nuclear Engineering
and Industrial Management

About the Author

Experience

B.S Chemical Engineering (2015-2019) - Michigan Technological University
M.S. Nuclear Engineering (2021-2023) - University of Idaho - NRC Fellow
Modeling and Simulation Intern at Idaho National Lab

Select Publications

Vandal, J., et al., 2023. A paper that is also a thesis chapter.
Journal of Idaho 100, 123456

Root, S. J., 5 2024. Dynamic system modeling and pid controller design for a molten salt microreactor.
Master's thesis, University of Idaho

Outline

Background

Block 1

- Item 1
- Item 2
- Item 3
- Item 4

Block 2

Block 3

Background

Block 1

Block 2

- Item 1
- Item 2
- Item 3

Block 3

Background

Block 1

Block 2

Block 3

- Item 1
- Item 2
- Item 3

Left Block 1

- Item 1
- Item 2
- Item 3

Left Block 2

ANS Logo

Molten Salt Nuclear Battery

Left Block 1

Left Block 2

- Item 1
- Item 2
- Item 3

UIdaho Logo

Citations

A Citation [1]

- Item 1
- Item 2

Another Citation [2]

No Citation

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[1] Vandal, J., et al., 2023. A paper that is also a thesis chapter. Journal of Idaho 100, 123456

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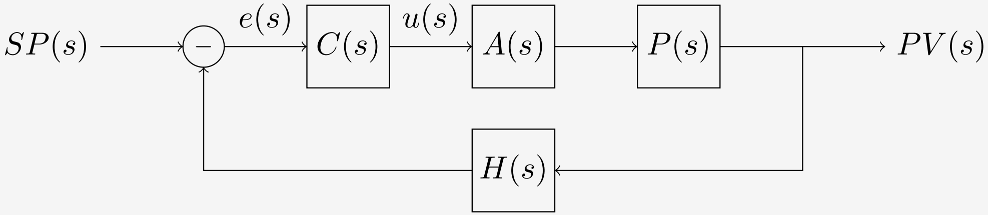
Subsection 1

A Tikz Drawing



An equation explained

$$u(t) = \underbrace{K_P e(t)}_{\text{Proportional}} + \underbrace{K_I \int_0^t e(t)dt}_{\text{Integral}} + \underbrace{K_D \frac{de(t)}{dt}}_{\text{Derivative}}$$

An equation explained

$$u(t) = \underbrace{K_P e(t)}_{\text{Proportional}} + \underbrace{K_I \int_0^t e(t)dt}_{\text{Integral}} + \underbrace{K_D \frac{de(t)}{dt}}_{\text{Derivative}}$$

Proportional

- Control output is manipulated in proportion to the error defined by the proportional gain constant
- High gain yields an aggressive controller that is prone to overshooting the set-point
- Low gain may result in steady-state offset

Integral

Derivative

An equation explained

$$u(t) = \underbrace{K_P e(t)}_{\text{Proportional}} + \underbrace{K_I \int_0^t e(t)dt}_{\text{Integral}} + \underbrace{K_D \frac{de(t)}{dt}}_{\text{Derivative}}$$

Proportional

Integral

- Considers cumulative error to help eliminate steady-state offset
- As the process variable settles around the set-point, the cumulative error approaches a constant value and the effect of the integral controller diminishes.

Derivative

An equation explained

$$u(t) = \underbrace{K_P e(t)}_{\text{Proportional}} + \underbrace{K_I \int_0^t e(t)dt}_{\text{Integral}} + \underbrace{K_D \frac{de(t)}{dt}}_{\text{Derivative}}$$

Proportional

Integral

Derivative

- Estimates the time rate of change of the error to dampen overshoot
- Backs-off the proportional response when the process variable rapidly approaches the set-point
- Can be difficult to tune

Subheadings

Heading

No subheading on this slide

Block for second slide

- Textbook Citation with chapter [3, Ch. 7]
- Another textbook citation with chapter [4, Ch. 6]

Block for third slide

[3] Kerlin, T. W. et al., 2019. Dynamics and Control of Nuclear Reactors. Knoxville, Tennessee: Elsevier Inc

[4] Duderstadt, J. J. et al., 1976. Nuclear Reactor Analysis. New York, NY: Wiley & Sons, first edition

Block for second slide

Block for third slide

- A citation that only appears for the third frame [1]
- Item 2

[?]

Block for 4th slide

- Emphasis *emphasis*
- Item 2
- $t_{1/2}$ halflife - bring back the citation from the second slide [4, Ch. 6]

$$^{87}Br \xrightarrow[56sec]{\beta^-} {}^{87}Kr^* \rightarrow {}^{86}Kr + n$$

Block for fifth slide

[4] Duderstadt, J. J. et al., 1976. Nuclear Reactor Analysis. New York, NY: Wiley & Sons, first edition

Block for 4th slide

Block for fifth slide

- Precursors produced near the core exit and long lived precursors may emit their neutrons outside of the core
- These neutrons are effectively lost from the fission chain reaction [3, Ch. 3]
- Larger power transport requires a higher flow rate
- Greater delayed neutron losses
- Negative feedback

[3] Kerlin, T. W. et al., 2019. Dynamics and Control of Nuclear Reactors. Knoxville, Tennessee: Elsevier Inc

A Table

Years	$c_4 \times 10^9$	$c_3 \times 10^6$	$c_2 \times 10^4$	$c_1 \times 10^2$	c_0	root $(^o)$	slope $(pcm/^o)$
0.0	-2.797	1.789	-4.361	4.829	-2.009	111.41	224.24
0.5	-2.755	1.755	-4.272	4.732	-1.976	113.69	203.69
1.0	-1.838	1.253	-3.253	3.826	-1.682	115.79	189.71
1.5	-2.533	1.632	-3.253	4.507	-1.909	117.38	175.96
2.0	-2.418	1.578	-3.930	4.440	-1.895	119.45	161.06
2.5	-1.461	1.026	-2.750	3.337	-1.515	121.06	152.71
3.0	-1.137	0.856	-2.425	3.070	-1.440	122.67	146.08
3.5	-2.054	1.357	-3.433	3.953	-1.727	124.58	130.85
4.0	-2.527	1.617	-3.967	4.438	-1.892	126.46	120.67
4.5	-2.869	1.831	-4.460	4.935	-2.081	128.35	111.30
5.0	-2.338	1.520	-3.785	4.291	-1.855	130.55	102.04
5.5	-1.471	1.054	-2.852	3.467	-1.585	132.29	93.34
6.0	-2.626	1.702	-4.211	4.729	-2.027	134.96	83.90
6.5	-1.672	1.141	-2.985	3.550	-1.607	137.45	77.56
7.0	-3.321	2.095	-5.036	5.492	-2.292	139.19	69.73
7.5	-2.419	1.579	-3.936	4.459	-1.932	142.69	59.45
8.0	-7.991	0.648	-1.960	2.623	-1.305	144.62	55.65

Conclusions

Summary of Work Completed

- Item 1
- Item 2
- Item 3

Results In-Brief

Conclusions

Summary of Work Completed

Results In-Brief

- Item 1
- Item 2
- Item 3

Acknowledgements

This work and my coursework is being completed under a Graduate Fellowship funded by Nuclear Regulatory Commission (NRC).

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