

# Assignment Web Similarity Analysis

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## Executive Summary

Overall Web Similarity Score: 0%

**Assessment:** The assignment shows no significant similarity to the provided web sources.

**Conclusion:** Based on the provided web sources, there is no evidence of plagiarism in the student's assignment. The assignment focuses on control system design calculations and simulations using Matlab and Simulink. The web sources provided are a PDF potentially related to electrical engineering (but content is garbled), a YouTube video about second-order systems (a common topic in control systems but no textual content provided), and a page from the National Library of Medicine. None of these sources contain content that directly overlaps with the student's specific calculations, model parameters, or Simulink results. While the student's work involves applying general control systems principles (which are common knowledge), the specific application and numerical results appear to be original.

## Web Sources Analyzed

Source URL	Similarity Score
https://www.emo.org.tr/ekler/b7e76e55da0d599_ek.pdf?tipi=1&turu=X&sube=6	<font color='green'>1.79%</font>
https://www.youtube.com/watch?v=YH4Pj8s9pQU&pp=ygUTI3NIY29uZG9yZGVybmh0Y2Vzmc%3D	<font color='green'>0.83%</font>
https://pmc.ncbi.nlm.nih.gov/articles/PMC3326359/	<font color='green'>26.54%</font>

## Detailed Content Matches

No specific content matches were identified.

# Full Assignment with Highlighted Plagiarism

*Sections highlighted in yellow with red text indicate potential plagiarism.*

EE5351: CONTROL SYSTEM DESIGN

LABORATORY 01

NAME

: BANDARA LRTD

REG No.

: EG/ 2021/ 4433

GROUP NO: CE07

DATE

: 24/01 /2025

Table 1: Summative Laboratory Form

Semester

Module Code

Module Name

Lab Number

Lab Name

Lab conduction date

Report Submission date

05

EE5351

Control System Design

01

Laboratory Section 1

2024.11.05

2025.01.24

Contents

1

OBSERVATION

6

2

CALCULATION

7

List of Tables

Table 1: Summative Laboratory Form

Table 2: Observations

6

List of Figures

Figure 1: MathLab code for the Speed Response

Figure 2: Speed Response Get by Matlab

Figure 3: Speed Response Given by Simulink

Figure 4: Speed Response in the Model

Figure 5: Comparing of the Speed Response with Model and State Vector

Figure 6: The Speed Response when  $K_P=1$

Figure 7: Speed Response from Simulink when  $K_P=1.25$

Figure 8: Speed Response from Simulink when  $K_P=1.50$

Figure 9: Speed Response from Simulink when  $K_P=1.75$

Figure 10: Speed Response from Simulink when  $K_P=2.0$

8

8

8

11

11

12

13

13

14

14

## 1 OBSERVATION

Table 1: Observations

Terminal Resistance ( $R_m$ )

Rotor inductance ( $L_m$ )

Equivalent( $J_m$ )

Torque constant ( $K_t$ )

Voltage constant ( $K_m$ )

8.4

1.16

$2.09 \times 10^{-3}$

0.042

0.042

$\Omega$

mH

$\text{kgm}^2$

Nm/A

Nm/A

## 2 CALCULATION

Q1.

i

.

1. Voltage equation:

$$V = R_m i + L_m \frac{di}{dt}$$

$$V = R_m i + L_m \frac{di}{dt}$$

$$+ L_m \frac{di}{dt}$$

$$=$$

2. Back EMF equation:

$$E_b = K \omega_m$$

3. Torque equation:

$$T = K \omega_m$$

$$E_b = K \omega_m$$

4. Motor torque relationship:

$$T = K \omega_m$$

ii From equations (1), (2), (3), and (4), the speed control transfer function is derived as:

$$\omega(s)$$

$$=$$

$$=$$

$$\omega(s) = \frac{K_t K_b}{s^2 + \left( \frac{R}{L} + \frac{K_b K_t}{J} \right) s + \frac{K_b K_t}{J}}$$

$$\omega(s)$$

$$0.042$$

$$=$$

$$-5$$

$$\omega(s) = \frac{2.09 \times 10^{-3} [8.4 + 1.16 \times 10^{-3} s] + 0.042 \times 0.042}{s^2 + 17.556 s + 2.4244 \times 10^{-3}}$$

$$\omega(s)$$

$$0.042$$

$$=$$

$$-8$$

$$2$$

$$\omega(s) = \frac{2.4244 \times 10^{-3} s + 17.556 \times 10^{-5} s + 1.764 \times 10^{-3}}{s^2 + 17.556 s + 2.4244 \times 10^{-3}}$$

From equations (1), (2), (3), and (4):

$$\theta(s)$$

$$=$$

$$=$$

$$\theta(s) = \frac{K_t K_b}{s^2 + \left( \frac{R}{L} + \frac{K_b K_t}{J} \right) s + \frac{K_b K_t}{J}}$$

$$\theta(s)$$

$$0.042$$

$$=$$

$$\theta(s) = \frac{2.4244 \times 10^{-8} s^3 + 17.556 \times 10^{-5} s^2 + 1.764 \times 10^{-3} s}{s^2 + 17.556 s + 2.4244 \times 10^{-3}}$$

iii

Figure 1: MathLab code for the Speed Response

Figure 2: Speed Response Get by Mathlab

Figure 3: Speed Response Given by Simulink

iv

Simplified Equations for Speed Control Transfer Function

$$\omega(s)$$

$$=$$

$$=$$

$$\omega(s) = \frac{K_t K_b}{s^2 + \left( \frac{R}{L} + \frac{K_b K_t}{J} \right) s + \frac{K_b K_t}{J}}$$

$$\omega(s)$$

$$0.042$$

$$=$$

$$\theta(s) \{2.09 \times 10^{-5} \cdot 8.4s + 0.042 \times 0.042\}$$

$$\omega(s)$$

$$0.042$$

$$=$$

$$-4$$

$$\theta(s) \{1.7556 \times 10^{-4} s + 1.764 \times 10^{-3}\}$$

Simplified Equations for Position Control Transfer Function

$$\theta(s)$$

$$\theta(s)$$

$$=$$

$$\theta(s) \{1.7556 \times 10^{-4} s + 1.764 \times 10^{-3}\}$$

$$\theta(s)$$

$$0.042$$

$$=$$

$$\theta(s) \{1.7556 \times 10^{-4} s + 1.764 \times 10^{-3}\}$$

v

vi

From the equations 1, 2, 3, 4;

$$\theta(s)$$

$$\theta(s)$$

$$\theta(s)$$

$$\theta(s) = - ( ) \theta(s) - ( ) \omega(s) +$$

$$\theta(s)$$

$$\theta(s)$$

$$\theta(s)$$

$$\theta(s)$$

$$\omega(s)$$

$$\theta(s) = ( ) \theta(s) + 0 \times \omega(s) + 0 \times \theta(s)$$

$$\theta(s)$$

$$\theta(s)$$

$$- ( ) \theta(s)$$

$$\theta(s)$$

$$\theta(s)$$

$$[ \theta(s) ] = [ \theta(s) ]$$

$$\theta(s)$$

$$\theta(s)$$

$$( \theta(s) )$$

$$\theta(s)$$

$$- ( \theta(s) )$$

$$\theta(s)$$

$$\theta(s)$$

$$-7241.38$$

$$[ \theta(s) ] = [ \theta(s) ]$$

■ ■

■

2009.57

■

0

1

■

][ ■ ] + [ ■ ■ ] ■ ■

■ ■

0

−36.21 ■ ■

862.07

][ ] + [

] ■ ■

■

0

0

■

vii

From the simplified equations

$$\theta_{11} = 0 \cdot \theta_1 + \omega_1 + 0 \cdot \theta_{11}$$

■ ■ ■ ■

■ ■

$\omega_1$

$$\theta_1 = 0 \cdot \theta_1 - ($$

$$) \omega_1 + ($$

$$) \theta_1$$

$$\theta_{11} \text{ eq}$$

$$\theta_{11} \text{ eq } \theta_{11} \theta_{11}$$

0

■ ■ ■

$$[ ] = [0$$

■ ■

■

1

0

■ ■

■

$$- (\theta_{11} \theta_{11}) [\theta_{11}] + [(\theta_{11} \theta_{11})] \theta_{11}$$

■ ■ ■ ■

$$\theta_{11} \text{ eq}$$

$$\text{eq } \theta_{11}$$

■  
 ■■  
 0  
 1  
 0  
 $[ \blacksquare ] = [$   
 $][ \blacksquare ] + [$   
 $] \blacksquare$   
 ■  
 0 – 10.05  
 239.23 ■  
 ■■  
 ■  
 ■

Q2.

Figure 4: Speed Response in the Model

Figure 5: Comparing of the Speed Response with Model and State Vector

2. According to my knowledge I think the basic thing for happening those kind of the error is negligence of the resistance where having in the rotor and also matlab is the software which required the best performance of the computers so considering the computers which has been used there can be errors as the performance.

Q3)

1.

Figure 6: The Speed Response when  $K_P=1$

2.

Steady State Error:

Overshoot =

$1 - 0.938$

$1.335 - 0.938$

$0.938$

$= 42.324\%$

$\times 100\%$

:

$0.062$

3.

Figure 7: Speed Response from Simulink when  $K_P=1.25$

According to the Figure 5 when  $K_p = 1.25$ ,

Steady state error =  $1 - 1.012 = 0.012$

Overshoot =

$$1.374 - 1.012$$

$$1.012$$

$$\times 100\%$$

$$= 35.770\%$$

.

Figure 8: Speed Response from Simulink when  $K_P=1.50$

According to the Figure 6 when  $K_p = 1.5$ ,

Steady state error =  $1 - 1.009 = 0.009$

Overshoot =

$$1.405 - 1.009$$

$$1.009$$

$$= 39.25\%$$

$$\times 100\%$$

Figure 9: Speed Response from Simulink when  $K_P=1.75$

According to the Figure 7 when  $K_p = 1.75$ ,

Steady state error =  $1 - 0.96$

=

$$0.04$$

Overshoot =

$$1.442 - 0.9603$$

$$0.9603$$

$$\times 100\%$$

$$= 50.161\%$$

Figure 10: Speed Response from Simulink when  $K_P=2.0$

According to the Figure 8 when  $K_p = 2$ ,

Steady state error =  $3.35 \times 10^{-2}$

Overshoot =

$$1.466 - 0.9633$$

$$0.9633$$

$$= 52.19\%$$

$$\times 100\%$$



# Analysis Methodology

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**Web Similarity Analysis Method:** This report analyzes the similarity between a student assignment and web content using multiple approaches:

1. **Basic similarity analysis** using TF-IDF vectorization and cosine similarity metrics to calculate statistical similarity between texts.
2. **Advanced semantic analysis** using Google's Gemini AI to identify conceptual similarities, common phrases, and potential plagiarism patterns.
3. **Source verification** by analyzing multiple sources to distinguish between common knowledge and unique content.

## Interpretation Guide:

- 0-15%: Very low similarity - Likely original content
- 16-30%: Low similarity - Contains common phrases but largely original
- 31-50%: Moderate similarity - May contain some paraphrased content
- 51-70%: High similarity - Contains substantial similar content
- 71-100%: Very high similarity - Significant portions may be unoriginal

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*Disclaimer: This automated similarity analysis provides an approximation of content similarity against web sources. Results should be interpreted by a human reviewer for context-appropriate assessment. Common knowledge, standard phrases, and coincidental matches may be flagged and require human judgment.*