

# Assignment Web Similarity Analysis

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## Executive Summary

**Overall Web Similarity Score:** 0%

**Assessment:** No significant similarity detected between the assignment and provided web sources.

**Conclusion:** The assignment shows no evidence of plagiarism from the provided web sources. The content of the assignment is technical and specific to control system design, focusing on equations, calculations, and experimental results. The web sources provided are either unrelated PDFs, a YouTube video link about second-order systems (which is a broad topic and doesn't contain the specific equations or data from the assignment), or a link to a scientific article on a different subject matter. Common elements like equation structures or general concepts within control systems theory would not be considered plagiarism.

## 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:

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

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

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

$$= V$$

2. Back EMF equation:

$$E_b = K_b \omega_m$$

3. Torque equation:

$$T = K_t \omega_m$$

$$T = K_t \omega_m$$

4. Motor torque relationship:

$$T = K_t \omega_m$$

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

$$\omega(s)$$

$$=$$

$$=$$

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

$$\omega(s)$$

$$0.042$$

$$=$$

$$-5$$

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

$$\omega(s)$$

$$0.042$$

$$=$$

$$-8$$

$$2$$

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

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

$$\theta(s)$$

$$=$$

$$=$$

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

$$\theta(s)$$

$$0.042$$

$$=$$

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

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

$$\omega(s)$$

$$=$$

$$=$$

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

$$\omega(s)$$

$$0.042$$

$$=$$

$$\frac{1}{s} \left( \frac{2.09 \times 10^{-5}}{s} + 8.4 \times 10^{-4} + 0.042 \times 0.042 \right)$$

$$\omega(s)$$

$$0.042$$

$$=$$

$$-4$$

$$\frac{1}{s} \left( \frac{1.7556 \times 10^{-4}}{s} + 1.764 \times 10^{-3} \right)$$

Simplified Equations for Position Control Transfer Function

$$\theta(s)$$

$$\frac{1}{s} \left( \frac{1.7556 \times 10^{-4}}{s} + 1.764 \times 10^{-3} \right)$$

$$=$$

$$\frac{1.7556 \times 10^{-4}}{s^2} + \frac{1.764 \times 10^{-3}}{s}$$

$$\theta(s)$$

$$0.042$$

$$=$$

$$\frac{1.7556 \times 10^{-4}}{s^2} + \frac{1.764 \times 10^{-3}}{s}$$

$$v$$

$$v_i$$

From the equations 1, 2, 3, 4;

$$\frac{1}{s} \left( \frac{1.7556 \times 10^{-4}}{s} + 1.764 \times 10^{-3} \right)$$

$$= - \left( \frac{1.7556 \times 10^{-4}}{s} \right) \omega(s) +$$

$$\frac{1.7556 \times 10^{-4}}{s^2} + \frac{1.764 \times 10^{-3}}{s}$$

$$= - \left( \frac{1.7556 \times 10^{-4}}{s} \right) \omega(s) + 0 \times \omega(s) + 0 \times \frac{1.7556 \times 10^{-4}}{s^2}$$

$$\omega(s)$$

$$=$$

$$- \left( \frac{1.7556 \times 10^{-4}}{s} \right)$$

$$\frac{1.7556 \times 10^{-4}}{s}$$

$$\frac{1.7556 \times 10^{-4}}{s}$$

$$[ \theta(s) ] = [ \frac{1.7556 \times 10^{-4}}{s} ]$$

$$\frac{1.7556 \times 10^{-4}}{s}$$

$$\frac{1.7556 \times 10^{-4}}{s}$$

$$\left( \frac{1.7556 \times 10^{-4}}{s} \right)$$

$$\frac{1.7556 \times 10^{-4}}{s}$$

$$- \left( \frac{1.7556 \times 10^{-4}}{s} \right)$$

$$\frac{1.7556 \times 10^{-4}}{s}$$

$$\frac{1.7556 \times 10^{-4}}{s}$$

$$-7241.38$$

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

■ ■

■

2009.57

■

0

1

■

][ ■ ] + [ ■ ■ ] ■ ■

■ ■

0

−36.21 ■ ■

862.07

][ ] + [

] ■ ■

■

0

0

■

vii

From the simplified equations

$$\theta_{\text{■ ■}} = 0 \cdot \theta_{\text{■}} + \omega_{\text{■}} + 0 \cdot \text{■ ■}$$

■ ■ ■ ■

■ ■

$\omega_{\text{■}}$

$$\text{■} = 0 \cdot \theta_{\text{■}} - ($$

$$) \omega_{\text{■}} + ($$

$$) \text{■}$$

$$\text{■ ■} \text{■ eq}$$

$$\text{■ eq} \text{■ ■} \text{■}$$

0

■ ■ ■

$$[ \text{ } ] = [ 0$$

■ ■

■

1

0

■ ■

■

$$- ( \text{■ ■} ) [ \text{■ ■} ] + [ ( \text{■ ■ ■} ) ] \text{■ ■}$$

■ ■ ■ ■

$$\text{■ eq}$$

$$\text{eq} \text{■}$$

■  
 ■■  
 0  
 1  
 0  
 [ ■ ] = [  
 ][ ■ ] + [  
 ]■  
 ■  
 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 KP=1

2.

Steady State Error:

Overshoot =

1-0.938

1.335-0.938

0.938

= 42.324%

× 100%

:

0.062

3.

Figure 7: Speed Response from Simulink when KP=1.25

According to the Figure 5 when Kp = 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.*