

PROYEK AKHIR - VM231838

**JUDUL PROYEK AKHIR DITULIS SINGKAT, JELAS
DAN MENGGAMBARAKAN TEMA POKOK**

NAMA SAYA

NRP. 023XXXXXXXXXX

Dosen Pembimbing

Pembimbing 1

NIP XXXX

Pembimbing 2

NIP XXX

Program Studi <Nama Program Studi Teknologi Rekayasa Manufaktur>

Departemen Teknik Mesin Industri

Fakultas Vokasi

Institut Teknologi Sepuluh Nopember

Surabaya

20XX



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MENGGAMBARAKAN TEMA POKOK**

NAMA MAHASISWA
NRP 023XXXXXXXXXX

Dosen Pembimbing

Nama Pembimbing 1

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Nama Pembimbing 2

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Program Studi <Nama Program Studi>
Departemen Teknik Mesin Industri
Fakultas Vokasi
Institut Teknologi Sepuluh Nopember
Surabaya
20XX



FINAL PROJECT - VM231838

FINAL PROJECT TITLE

STUDENT NAME

NRP 023XXXXXXXXXX

Advisor

Advisor 1

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NIP XXX

Study Program <Name of Study Program>

Department of Industrial Mechanical Engineering

Vocational Faculty

Institut Teknologi Sepuluh Nopember

Surabaya

2XXX

LEMBAR PENGESAHAN

**JUDUL PROYEK AKHIR DITULIS SINGKAT JELAS DAN MENGGAMBARKAN
TEMA POKOK**

PROYEK AKHIR

Diajukan untuk memenuhi salah satu syarat
memperoleh gelar Sarjana Terapan pada
Program Studi Diploma 4 <Nama Program Studi>
Departemen Teknik Mesin Industri
Fakultas Vokasi
Institut Teknologi Sepuluh Nopember

Oleh: **Nama Saya**

NRP. 023XXXXXXXXXX

Disetujui oleh Tim Penguji Tugas Akhir:

- | | |
|------------------------------|---------------|
| 1. Nama dan gelar pembimbing | Pembimbing I |
| 2. Nama dan gelar pembimbing | Ko-pembimbing |
| 3. Nama dan gelar penguji | Penguji |
| 4. Nama dan gelar penguji | Penguji |
| 5. Nama dan gelar penguji | Penguji |

SURABAYA

Bulan, Tahun

APPROVAL SHEET

**THE TITLE OF THE FINAL PROJECT IS WRITTEN BRIEFLY, CLEARLY AND
DESCRIBING THE MAIN THEME**

FINAL PROJECT

Submitted to fulfill one of the requirements
for obtaining a Applied Bachelor degree at
Applied Bachelor Program of Manufacturer Engineering Technology (D4) / Applied Bachelor
Program of Energy Conversion Engineering Technology (D4)
Department of Industrial Mechanical Engineering
Faculty of Vocational Studier
Institut Teknologi Sepuluh Nopember

By: **Nama Saya**

NRP. 023XXXXXXXXXX

Approved by Final Project Examiner Team:

- | | |
|--|------------|
| 1. Name of Advisor and academic title | Advisor |
| 2. Name of Co-Advisor and academic title | Co-Advisor |
| 3. Name of Examiner and academic title | Examiner |
| 4. Name of Examiner and academic title | Examiner |
| 5. Name of Examiner and academic title | Examiner |

SURABAYA

Month, Year

PERNYATAAN ORISINALITAS

Yang bertanda tangan di bawah ini.

Nama Mahasiswa / NRP : Nama Saya

Departemen / Prodi : Teknik Mesin Industri / D4 Teknologi Rekayasa Manufaktur

Dosen Pembimbing / NIP :

dengan ini menyatakan bahwa Proyek Akhir dengan judul “**JUDUL ANDA**” adalah hasil karya saya sendiri, bersifat orisinal, dan ditulis dengan mengikuti kaidah penulisan ilmiah. Bilamana di kemudian hari ditemukan ketidaksesuaian dengan pernyataan ini, maka saya bersedia menerima sanksi sesuai dengan ketentuan yang berlaku di Institut Teknologi Sepuluh Nopember.

Mengetahui
Dosen Pembimbing

Surabaya, XX Bulan 2XXX
Mahasiswa,

(
NIP.

(Nama Saya)
NRP. XXXXXXXXXX

ABSTRAK

JUDUL ANDA

Nama Mahasiswa / NRP : Nama Saya
Departemen : Teknik Mesin Industri Fakultas Vokasi ITS
Dosen Pembimbing : Pembimbing 1
Pembimbing 2

Abstrak

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. 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

Kata Kunci: *ABS, Fault Tolerant Control, inverter, motor BLDC*

ABSTRACT

TITLE

Student Name /NRP : **My Name / 023xxx**
Department : **Industrial Mechanical Engineering Vocational Faculty ITS**
Advisor : **Name of advisor and academic title**

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. 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

Keywords: *ABS, Fault Tolerant Control, inverter, motor B*

KATA PENGANTAR

Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan et iusto odio dignissim qui blandit praesent luptatum zzril delenit augue duiis dolore te feugait nulla facilisi:

1. Lorem ipsum dolor sit amet, consetetur sadipscing elitr
2. Lorem ipsum dolor sit amet, consetetur sadipscing elitr
3. Lorem ipsum dolor sit amet, consetetur sadipscing elitr
4. Lorem ipsum dolor sit amet, consetetur sadipscing elitr
5. Lorem ipsum dolor sit amet, consetetur sadipscing elitr

Serta pihak-pihak lain yang tidak dapat disebutkan satu-persatu. Semoga laporan tugas akhir ini dapat dipergunakan dengan sebaik-baiknya.

Surabaya, XX Bulan 2XXX
Penulis

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BAB I

PENDAHULUAN

I.1 Latar Belakang

Latar belakang berisi alasan mengapa riset yang diambil perlu untuk diselesaikan. Kedua perlu diberikan penjelasan menyeluruh perkembangan riset untuk mengatasi masalah dalam riset yang diambil. Ketiga adalah alasan pemilihan metode dalam riset yang diambil dibandingkan dengan perkembangan pada point kedua. Keempat perlu diberikan penjelasan perkembangan riset kedepan atas diselesaikannya riset yang diambil.

Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Westbrook, 2005). Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Shiosansi, 2008), Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Offer, 2010). Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Tur, 2007).

Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Tur, 2007). Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Gao, 2001). Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Murali, 2017), Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Bai, 2011), Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Gao, 2001).

Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Errabelli, 2012). Lorem ipsum dolor sit amet, consetetur sadipscing elitr (Blanke, 1999). Lorem ipsum dolor sit amet, consetetur sadipscing elitr. Lorem ipsum dolor sit amet, consetetur sadipscing elitr. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod

I.2 Rumusan Masalah

Rumusan masalah berisi runtutan masalah yang akan diselesaikan dalam riset yang diambil:

- a) Lorem ipsum dolor sit amet, consetetur sadipscing elitr?
- b) Lorem ipsum dolor sit amet, consetetur sadipscing elitr?

I.3 Batasan Masalah

Batasan masalah sesuatu yang harus diberikan pada riset yang diambil untuk menghilangkan generalisasi asumsi. Misalkan *brand*, ruang lingkup *plant*, tipe alat, dsb:

- a) Lorem ipsum dolor sit amet, consetetur sadipscing elitr
- b) Lorem ipsum dolor sit amet, consetetur sadipscing elitr
- c) Lorem ipsum dolor sit amet, consetetur sadipscing elitr

I.4 Tujuan

Tujuan dijelaskan untuk, minimal, menjawab rumusan masalah yang dibuat:

- a) Lorem ipsum dolor sit amet, consetetur sadipscing elitr
- b) Lorem ipsum dolor sit amet, consetetur sadipscing elitr

I.5 Manfaat

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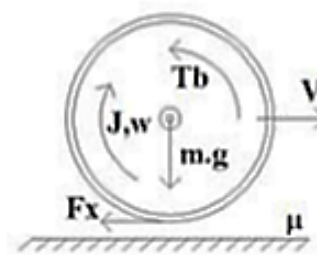
BAB II TINJAUAN PUSTAKA DAN DASAR TEORI

II.1 Hasil Penelitian Terdahulu

Teori penunjang berisi studi pustaka materi dalam riset yang diambil (Lubbers, 2014). Persamaan ditulis sesuai dengan format berikut, rata kiri dengan **Cambria Math** (Font size: 12) dan ukuran *numbering* (2.1) adalah 12. Sitasi harus selalu diberikan jika mengambil referensi dari sumber lain (Tur, 2007):

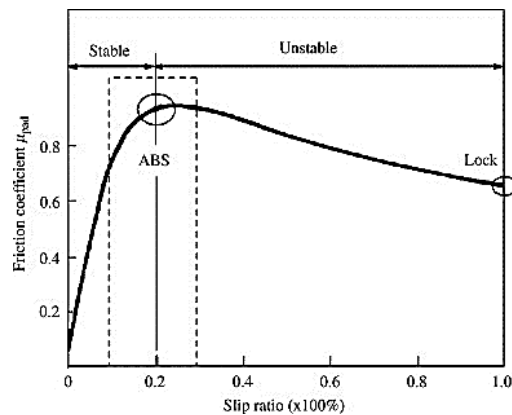
$$F_x = \mu \cdot m \cdot g \quad (2.1)$$

$$F_a = 0,5 \cdot c_r \cdot \delta \cdot A_f \cdot v^2 \quad (2.2)$$



Gambar 2.1 Quarter car model

II.2 Dasar Teori



Gambar 2.2 Kurva hubungan *slip ratio* dengan *friction coefficient* mmmmmmmmm

$$F_x = \mu \cdot m \cdot g \quad (2.3)$$

At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet (Gao, 2001).

II.3 Sub Materi 3

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua (Murali, 2017).

Jika Panjang tabel tidak melebihi ukuran A4, maka tabel tidak diperkenankan terpotong dengan halaman lain sehingga harus dalam 1 halaman yang sama (Singh, 2012). Jika panjang tabel melebihi panjang A4, header tabel (baris merah dibawah) harus dimunculkan dalam halaman lanjutan

Tabel 2.1 Urutan komutasi six-step inverter hmhj mbmbm nmbmmm kkkkkk djduud ddjj

Rotor Pos. (deg)	H1	H2	H3	Switch tutup	Phase		
					A	B	C
0-60	1	0	0	Q1 Q4	+	-	Off
60-120	1	1	0	Q1 Q6	+	Off	-
120-180	0	1	0	Q3 Q6	Off	+	-
180-240	0	1	1	Q3 Q2	-	+	off
240-300	0	0	1	Q5 Q2	-	Off	+
300-360	1	0	1	Q5 Q4	off	-	+

BAB III METODOLOGI PENELITIAN

III.1 Metode yang Digunakan

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

III.2 Bahan dan Peralatan yang Digunakan

III.2.1 Sub Sub Materi 1

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$$F_x = \mu \cdot m \cdot g \quad (3.1)$$

$$-4(F_x + F_a + F_w) = m \frac{dv}{dt} \quad (3.2)$$

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat, (2.1), (2.2), (2.3) (Tur, 2007):

Tabel 3.1 Variabel pada persamaan gaya

No.	Simbol	Variabel (satuan)	Nilai
1.	m	Massa QCM (kg)	425
2.	g	Percepatan gravitasi (m/s ²)	9,8
3.	c_r	Koefisien aerodinamik	0,3
4.	δ	Densitas udara (kg/m ³)	1,225
5.	A_f	Luas permukaan frontal (m ²)	3,1
7.	c_t	Koefisien resistansi putaran roda	0,01
8.	α	Sudut jalan qcm (rad)	0

III.2.2 Sub Sub Materi 2

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat (Murali, 2017)

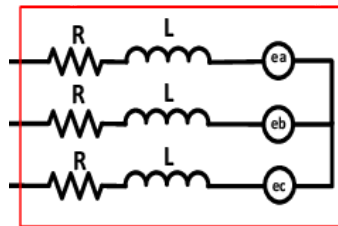
$$\mu(\lambda, v) = \left(c_1 \left(1 - e^{-c_2 \lambda} \right) - c_3 \lambda \right) \cdot e^{-c_4 \lambda v} \quad (3.3)$$

III.3 Urutan Pelaksanaan Penelitian

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III.4 Sub Materi 4

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Gambar 3.1 Rangkaian equivalen BLDC

$$V_a = Ri_a + L \frac{di_a}{dt} + e_a \quad (3.4)$$

$$V_b = Ri_b + L \frac{di_b}{dt} + e_b \quad (3.5)$$

III.5 Sub Materi 5

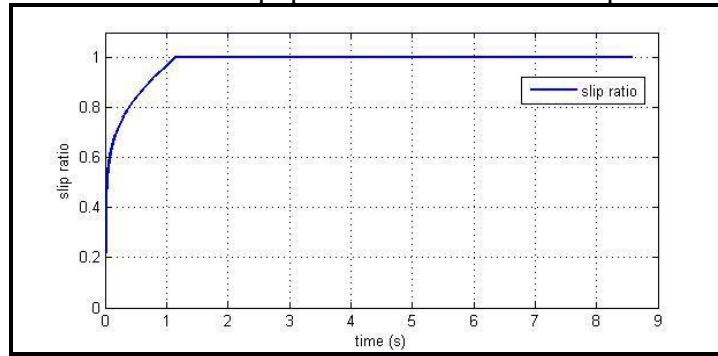
Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

BAB IV

HASIL DAN PEMBAHASAN

IV.1 Hasil Penelitian

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Gambar 4.1 Respon *slip ratio* saat pengereman

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. cepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

IV.2 Pembahasan

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Tabel 4.1 Performansi kontrol speed

Kriteria Performansi	Nilai
Rise time	0,12 s
Settling Time	0,18 s
Max. overshoot	0%

IV.3 Sub Materi 3

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.

IV.4 Sub Materi 4

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.

IV.4.1 Kesalahan pada Switch 1

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua:

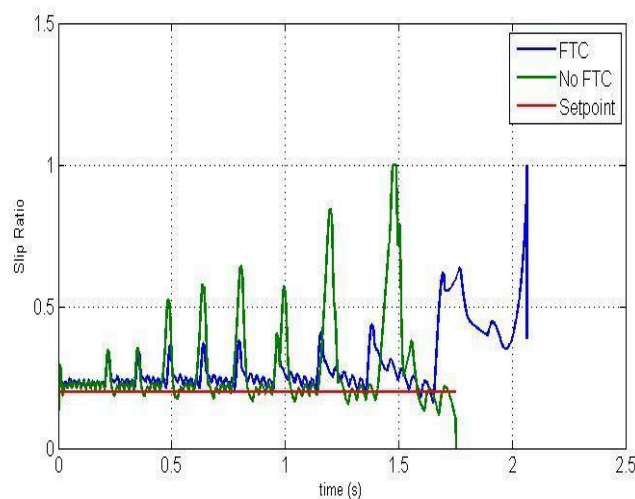
IV.4.2 Kesalahan pada Switch 2

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore:

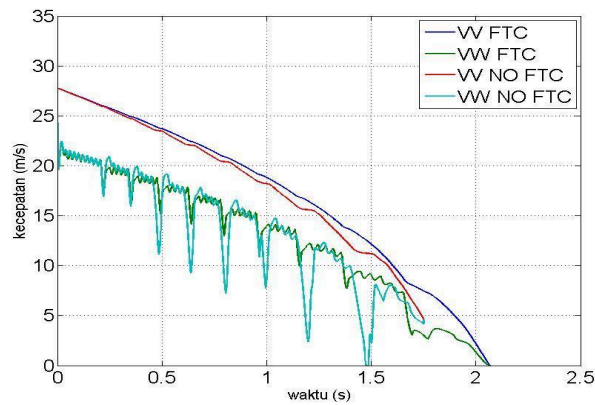
IV.4.3 Kesalahan pada Switch 3

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua:

- gkd fhd fhnzd
- khhf.hn.xhhhh
- jhlkxfjhlxjh
- jn,xmfhn.



Gambar 4.2 Perbandingan *slip ratio* dengan dan tanpa FTC pada kesalahan *switch* 5. Perbandingan *slip ratio* dengan dan tanpa FTC pada kesalahan *Switch* 1 dan 2



Gambar 4.3 Perbandingan penurunan kecepatan kesalahan *switch* 5 dengan dan tanpa FTC

BAB V

KESIMPULAN DAN SARAN

V.1 Kesimpulan

Kesimpulan menjawab permasalahan dengan penjelasan detail informasi yang telah dibahas pada BAB 4:

- Lorem ipsum dolor sit amet, consetetur sadipscing elitr.
- Lorem ipsum dolor sit amet, consetetur sadipscing elitr.
- Lorem ipsum dolor sit amet, consetetur sadipscing elitr

V.2 Saran

Saran berisi tentang kemungkinan penelitian lanjutan:

- Lorem ipsum dolor sit amet, consetetur sadipscing elitr.
- Lorem ipsum dolor sit amet, consetetur sadipscing elitr.
- Lorem ipsum dolor sit amet, consetetur sadipscing

DAFTAR PUSTAKA

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LAMPIRAN

A. Sistem Pengereman Regenerative sebagai ABS

Zfhzdddh fhxxfh fhddjd hxfgx dngz nfgkdjghskldr gjdkfgsdlkr jgdkfdslk gjdlkfgdl fgslkdglsgd fljgsldj fgjdljs. Jdfgkhdkslgh zgbmbgd zbgglz ngzdkgdkg kjzfglz. jghzdkghz, gkdjhgk dghkdgh dkhfglkdg.

B. Quarter Car Model



Gambar B.1 Diagram blok algoritma hfjsK

C. Kode Matlab

```
clc;  
%% parameter  
m = 425;
```

BIODATA PENULIS

Photo closed-up



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