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**FACULTY OF ENGINEERING**

**Senior2 Mechatronics Engineering program**

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**MCT445 – Mechatronics in Automotive Application**

**Lab (7)**

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# Introduction

Electronic Brakeforce Distribution (EBD) is an advanced braking technology that dynamically adjusts the distribution of brake force between the front and rear wheels to optimize stopping performance and vehicle stability. Under braking, weight shifts toward the front axle, reducing the normal force—and hence traction—on the rear wheels. EBD compensates for this by reducing rear brake force and maximizing front braking efficiency.

In contrast to conventional braking systems that apply a fixed brake force ratio (e.g., 60:40), EBD responds in real time to vehicle load, speed, and wheel slip conditions. This helps prevent rear-wheel lockup, maintain optimal tire-road friction (typically near a wheel slip ratio of 0.2), and reduce stopping distance. In this experiment, EBD is implemented and compared against a fixed ratio braking system to evaluate its effectiveness in improving braking performance and safety.

# Model

A computer screen shot of a diagram

AI-generated content may be incorrect.

Figure 1-overview model

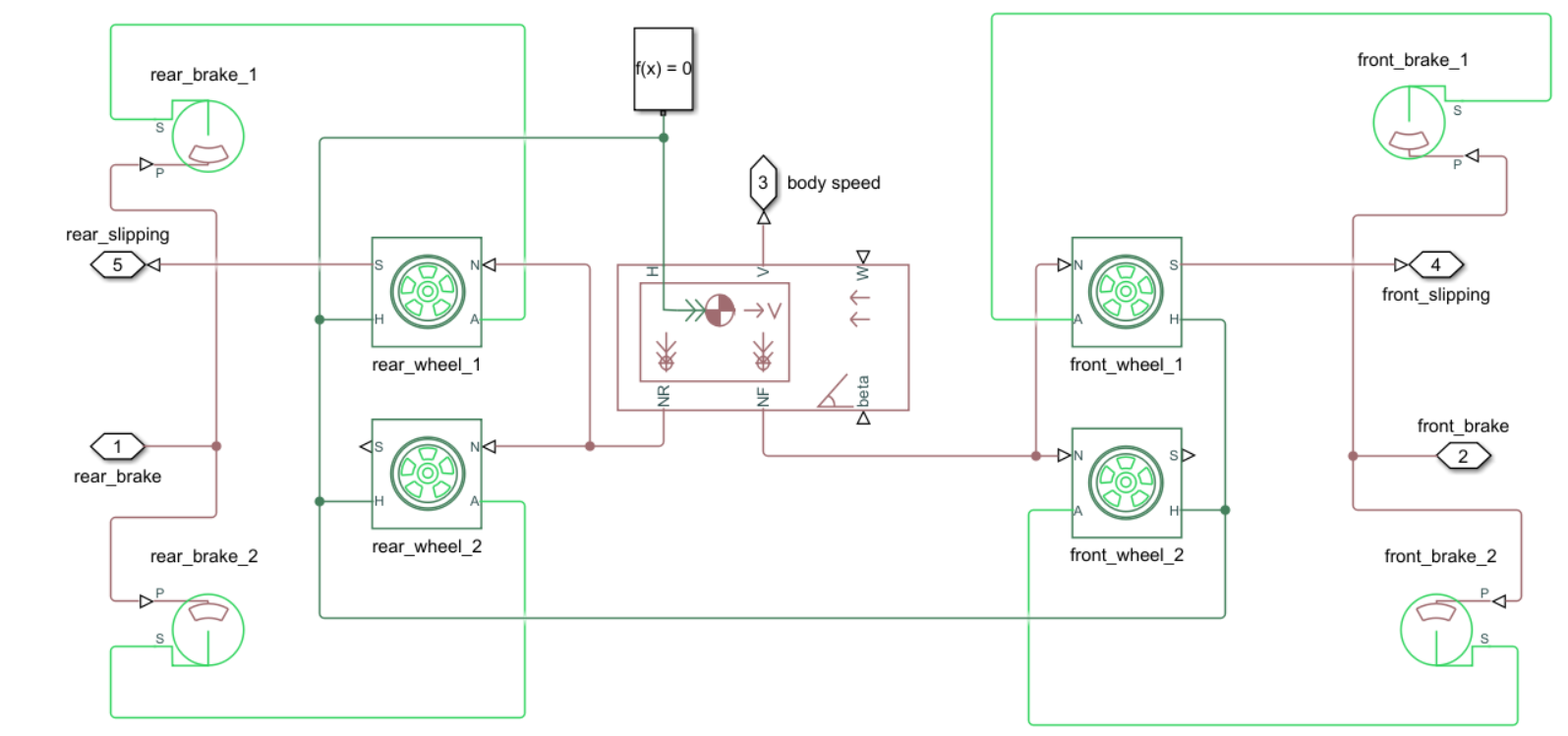


Figure 2-vehicle model

A diagram of a diagram

AI-generated content may be incorrect.

Figure 3-brake force

A screen shot of a computer

AI-generated content may be incorrect.

Figure 4-stateflow chart

# Parameters

Rear slip threshold = -0.0005

Slip diff threshold = 0.0001

Rear pressure increment = 1.03

# Results

Direct driver force brake:

A screenshot of a graph

AI-generated content may be incorrect.

Figure 5-direct driver force brake results

Stop dist = 100m

EBD force brake

A screenshot of a computer screen

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Figure 6-EBD force brake results

Stop dist = 67m

# Model link

<https://github.com/hossam-selem/Automotive/tree/main/lab7-EBD>