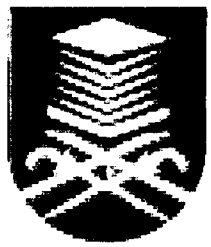

SYSTEM RESPONSE ANALYSIS & CONTROLLER DESIGN OF THE FRONT ADJUSTABLE SUSPENSION SYSTEM OF WAJA USING MATLAB SIMULINK

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A thesis submitted in partial fulfillment of the requirements for the award of Bachelor Engineering (Hons) (Mechanical)

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MAY 2009

"I declared that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree."

Signed: .....

Date : 22 May 2009

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ACKNOWLEDGEMENT

First and foremost, I would like to thanks to God because give me strength and opportunity to complete my thesis. Only with God permission, I'm able to complete this thesis successfully.

I also like to express my special gratitude and appreciation to my supervisor, Mr. Zulkifli bin Mohamed for his continuous support, generous guidance, commitment and valuable opinion in the duration of this project until its completion. I also want to thanks to all my friends for their support and encouragement to succeed and finished this report.

Last, but not least, I would express my appreciation to my family and my parents Mohd Ali Bin Hassim and Zaleha Binti Dol for their support and patience for the duration of my time to finish this thesis.

ABSTRACT

The main purpose of this project is to maximize the car's handling and braking for good active safety and driving pleasure, and keeping vehicle occupants comfortable and reasonably well isolated from road noise, bumps, and vibrations. Comfort and road handling performance of a passenger car are mainly determined by the damping characteristic of the shock absorbers. Passive shock absorbers have a fixed damping characteristic determined by their design. Depending on the road excitation, however, it is desirable to adjust this characteristic to increase performance. Semi-active suspension systems offer the possibility to vary the damper characteristics along with the road profile by changing the restriction of one or two current controlled valves or by changing the viscosity of a magneto-rheological fluid. Semi-active suspensions are less complex, more reliable and it costs far less than active suspension. They do not require an external power source (e.g. hydraulic pump) and are safer because they can only dissipate energy and therefore cannot render the system unstable. The semi-active suspension system can be a good candidate for practical applications because it combines the advantages of passive and active suspension systems. The simulation process of this project will be done using MATLAB Simulink software. The block diagram based on the mathematical model is constructed and the result will be obtained by simulating the model. Analysis and controller design will be based upon the simulation. Finally, controller design based on the Skyhook control strategy will be introduce to improve the suspension system performance.

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