# Review of: "Simulation of Control System for a Half-Car Suspension System for Passenger Vehicle Application by Designing an LQR Controller"

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Potential competing interests: No potential competing interests to declare.

This paper presents a mathematical model for a 4-degree-of-freedom (4-DOF) half-car active suspension system (ASS) using an LQR (Linear Quadratic Regulator) controller to optimize ride comfort and vehicle handling. The simulation results demonstrate that this study has enhanced its modeling and control capabilities. The comments on this paper are as follows:

1- Model Simplification: The study utilized a static dynamics model for controller design and simulation. However, the vehicle suspension system is a complex dynamic system that is influenced by various factors, including vehicle speed and road conditions. Therefore, using a static model may not fully and accurately describe the actual behavior of the system.

2- Limited types of input disturbances: The study only considered sinusoidal and random types of road input disturbances. However, there may be other types of disturbances on the actual road, such as shocks, bumps, and so on. Consequently, the findings of the study may not completely reflect the performance of the suspension system under real-world road conditions.

3- Limited controller design methods: The study utilized the linear quadratic regulator (LQR) as a controller design method. While the Linear Quadratic Regulator (LQR) is a commonly used controller design method, it may not adequately account for the impact of nonlinear and time-varying factors on suspension system performance. As a result, other more advanced controller design approaches may require additional research and implementation.

4- Lack of practical experimental verification: The study only utilized MATLAB/Simulink for simulation, and there was a lack of experimental verification on real vehicles. Practical experiments can provide a more accurate evaluation of the controller's performance and validate the accuracy of the simulation results.

5- Lack of comparison with other suspension systems: The study only compared the performance differences between active and passive suspension systems, and did not

include comparisons with other types of suspension systems. For various types of suspension systems, such as semi-active suspension systems and electro-hydraulic suspension systems, their performance differences may vary. In summary, this study has some limitations in model simplification, input perturbation types, controller design methods, experimental verification, and performance comparison, which require further research and improvement.