

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.

Scope: The scope of the article is limited to the system modeling and designing a model-based controller to enhance the ride comfort of the vehicle. The study is however limited to the simulations.

Comments:

1. The abbreviation notification must be consistent. For example, in introduction section you have use active suspension system and wrote its abbreviation in brackets, however the order was changed when you wrote about linear quadratic regulator.
2. What is PSS? And what it highlights?
3. Heave displacement is specific to marine vehicles. I suggest to replace it with vehicle wheel, and/or sprung mass displacements.
4. Please provide a reference for "vehicle handling regulation" term.
5. In the last para of Introduction section, please provide references to where the researchers have used the LQR before and in what context. Also, please explain and provide references to what types of sensors and actuators are commonly used in ASS.
6. The last introduction paragraph lacks references throughout the writing. Moreover, there exist no static dynamic model, otherwise please provide the reference.
7. The reason why the tire (vertical force) model --as separate suspension-- is excluded from the overall dynamic model is that it introduces high frequencies to the system. This causes, for example, the nonlinear simulations to be run at smaller time steps (high system frequency). See, "Modeling of Tire Lateral Forces in Non-linear 6-DOF Simulations for Off-Road Vehicles", <https://doi.org/10.1016/j.ifacol.2022.11.107>. It is true as the spring coefficient of tire is about 10 times bigger than that of the car's suspension unit (see, the Table 1 in paper).
8. The pitching moment is positive as shown in Fig. 1, when the forward motion is positive, and leftside motion is positive(+y on left side). So when the front strut-mount point moves up (+z), the rear strut-mount moves down, which will cause a negative pitch angle.
9. j? should it be J (moment of inertia) in equations where the variables are defined.
10. Please specify the control inputs.
11. Typo in Equation (10) ($\mathbf{x}^T \mathbf{Q} \mathbf{x}$... second x must be capital).

12. Road classification ISO 8608? (see, for example, Agostinacchio, M., Ciampa, D. & Olita, S. The vibrations induced by surface irregularities in road pavements – a Matlab[®] approach. *Eur. Transp. Res. Rev.* **6**, 267–275 (2014). <https://doi.org/10.1007/s12544-013-0127-8>).
13. Pitching dynamics in lateral direction? it should be about longitudinal direction.
14. Typo in Figure 13, Sprung Maas (correct the spelling).
15. Regarding conclusion, there are other studies which show that even a basic PID, can improve the ride comfort when ASS is utilized. So, there is no point is discussing LQR without comparing simulation results to other (perhaps simple) controllers.
16. Moreover, what system frequencies are used in simulations, and at what frequency the controller must operate?

Final Comments: The draft currently needs much improvements before it could be considered for, e.g., an IFAC conference. The flow of the writing has inconsistencies and relevant theoretical details are often missing.