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.

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

Reviewer Report

The authors focused on the modeling and control of a passenger half-car suspension system. A mathematical model for a linear 4-DOF car suspension system was built and derived under dynamic conditions. A chosen controller was then used after the dynamic model had been created, and its performance was evaluated at various vehicle speeds while being subjected to input disturbances from bumpy roads. The effectiveness and performance of the controller were verified by simulation using MATLAB/Simulink. In the vertical direction, peak-to-peak, the active suspension system (ASS) with an LQR controller improves performance. Additionally, sprung masses tilting in the lateral direction improved. The new design with an LQR controller successfully controls the dynamic effect in both expected and random road inputs. In the Simulink graph, the controller provides improved comfort in the vertical and lateral directions and good handling at the two wheels.

Paper has a very good contribution in the respective field. Overall, the paper has innovation and significant contributions. There is a minor revision in the paper.

1. **The section of introduction is extremely limited; the author should improve it by adding references i.e.**

- “Stability and bifurcation analysis of a buckled beam via active control”, Applied Mathematical Modelling, Volume 82, (2020), pp. 649-665.
- “On the nonlinear dynamics of constant stiffness coefficients 16-pole rotor active magnetic bearings system”, European Journal of Mechanics - A/Solids 84 (2020) 104051.
- “Nonlinear modified positive position feedback control of a cantilever beam system carrying an intermediate lumped mass”, Alexandria Engineering Journal (2020) Vol. 59(5), pp. 3847–3862.
- “Bifurcation analysis of a composite cantilever beam via 1:3 internal resonance”, Journal of The Egyptian Mathematical Society (2020) 28:45.

- “A proportional derivative (PD) controller for suppression the vibrations of a contact-mode AFM model” IEEE Access (2020) Vol. 8, pp. 214061- 214070.
- “Nonlinear vibrations control of a contact-mode AFM model via a time-delayed positive position feedback”, Alexandria Engineering Journal (2021) Vol. 60 (1), pp. 963-977.
- “Non-Linear Interactions of Jeffcott-Rotor System Controlled by a Radial PD-Control Algorithm and Eight-Pole Magnetic Bearings Actuator” Applied Sciences (Switzerland), 2022, 12(13), 6688.
- “On the rub-impact force, bifurcations analysis, and vibrations control of a nonlinear rotor system controlled by magnetic actuator integrated with PIRC-control algorithm” SN Applied Sciences, 2023, 5(1), 41.
- “Vibration Control of Horizontally Supported Jeffcott-Rotor System Utilizing PIRC-controller” Menoufia Journal of Electronic Engineering Research (MJEER), VOL. 32, NO. 2, July 2023.

Recommendation: Accepted after minor revision as suggested above.