

## Simulation for Squat Exercise of an Active Controlled Vibration Isolation and Stabilization System for Astronaut's Exercise Platform

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**Abstract :** In a task to assist NASA in analyzing the dynamic forces caused by operational countermeasures of an astronaut's exercise platform impacting the spacecraft, feedback delay, and signal noise were added to a simulation model of an active-controlled vibration isolation system to regulate the movement of the exercise platform. Previous simulation work was conducted primarily via MATLAB/Simulink. Two additional simulation tools used in this study were Trick and MBDyn, NASA co-developed software simulation environments. Simulation results obtained from these three tools were very similar. All simulation results support the hypothesis that an active-controlled vibration isolation system outperforms a passive-controlled system even with the addition of feedback delay and signal noise to the active-controlled system. In this paper, squat exercise was used in creating excited force to the simulation model. The exciter force from a squat exercise was calculated from the motion capture of an exerciser. The simulation results demonstrate much greater transmitted force reduction in the active-controlled system than the passive-controlled system.

**Keywords :** control, counterweight, isolation, vibration

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