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Coding Structures for Seated Row Simulation of an Active Controlled Vibration Isolation and Stabilization System for Astronaut's Exercise Platform

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Abstract : Simulation for seated row exercise was a continued task to assist NASA in analyzing a one-dimensional vibration isolation and stabilization system for astronaut's exercise platform. Feedback delay and signal noise were added to the model as previously done in simulation for squat exercise. Simulation runs for this study were conducted in two software simulation tools, Trick and MBDyn, software simulation environments developed at the NASA Johnson Space Center. The exciter force in the simulation was calculated from the motion capture of an exerciser during a seated row exercise. The simulation runs include passive control, active control using a Proportional, Integral, Derivative (PID) controller, and active control using a Piecewise Linear Integral Derivative (PWLID) controller. Output parameters include displacements of the exercise platform, the exerciser, and the counterweight; transmitted force to the wall of spacecraft; and actuator force to the platform. The simulation results showed excellent force reduction in the actively controlled system compared to the passive controlled system, which showed less force reduction.

Keywords : control, counterweight, isolation, vibration.
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