A Pilot Study of the Effects of Vertical Ride Motion on Reach Kinematics

Kevin A. Rider, Kathryn J. Mikol, Don B. Chaffin, Matthew P. Reed, and Kyle J. Nebel

Vehicle motions can adversely affect the ability of a driver or occupant to quickly and accurately push control buttons located in many advanced vehicle control, navigation and communications systems. A pilot study was conducted using the U.S. Army Tank Automotive and Armaments Command (TACOM) Ride Motion Simulator (RMS) to assess the effects of vertical ride motion on the kinematics of reaching. The RMS was programmed to produce 0.5 g and 0.8 g peak-to-peak sinusoidal inputs at the seat-sitter interface over a range of frequencies. Two participants performed seated reaching tasks to locations typical of in-vehicle controls under static conditions and with single-frequency inputs between 0 and 10 Hz. The participants also held terminal reach postures during 0.5 to 32 Hz sine sweeps. Reach kinematics were recorded using a 10-camera VICON motion capture system. The effects of vertical ride motion on movement time, accuracy, and subjective responses were assessed. Performance decrements associated with vertical ride motion were found to depend strongly on reach direction and frequency.

abs2003_13