

Improving Seat Comfort by Semi-Active Control of Magnetorheological Damper

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Abstract : Drivers of agricultural vehicles are exposed to continuous vibration caused by driving over rough terrain. The long-term effects of these vibrations could start with a decreased level of vigilance at work and could reach the level of several health problems. Therefore, eliminating the vibration to maximize the comfort of the driver is essential for better/longer performance. One of the modern damping systems, which can deal with this problem is the Semi-active (S/A) suspension system featuring a Magnetorheological (MR) damper. With this damper, the damping level can be adjusted using varying currents through the coil. Adjustments of the damping force can be carried out continuously based on the evaluated data (position and acceleration of seat) by the control algorithm. The advantage of this system is the wide dynamic range and the high speed of force response time. Compared to other S/A or active systems, the MR damper does not need as much electrical power, and the system is much simpler. This paper aims to prove the effectiveness of this damping system used in the tractor seat. The vibration testing stand was designed and manufactured specifically for this type of research, which is used to simulate vibrations with constant amplitude at variable frequency.

Keywords : magnetorheological damper, semi-active suspension, seat scissor mechanism, sky-hook

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