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Full car vehicle suspension state estimation for control of active suspension

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The Damper displacement and velocity used for controlling the full car suspension is estimated from noisy measurements of four linear voltage difference displacement(LVDT) and four load cells(LC) in quarter car model configuration. The 14 states of the suspension in a full car model estimated from 8 noisy measurements using 14 state Kalman observer is avoided due to the requirement of calculating 8x8 inverse matrix for Kalman gains. In the proposed method the number of sensors is reduced 8 to 4 by measuring the suspension angular displacements and velocities and using a 4x4 matrix inverse for implementing the 14-state Full Car Kalman observer. The observer is tested for cyclic and noncyclic disturbances. The cyclic input disturbance is modeled as a sine function augmented with road grade random white gaussian noise. The noncyclic disturbance input is modelled as a speed bump augmented with random white gaussian noise. The results presented indicate the accuracy of the estimator to be better than 0.2 percent of the Actual measurements.

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