

Dynamics analysis of hand wheel actuator in steer-by-wire electric system of car

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Abstract: Mechanically coupled electric power steering systems of cars are expected to be replaced by steer-by-wire electrical systems. In general, steer-by-wire system is composed of two sub-systems: road wheel actuator and hand wheel actuator. Road wheel actuator is responsible to set wheels at correct angle and in consequence to steer the vehicle in correct direction. Hand wheel actuator reads the driver's commands (senses the external torque exerted by driver), provides the road feedback to the driver and sends commands to the hand wheel actuator. Lack of mechanical coupling between steer-by-wire system components enforces employment of additional safety measures. In the paper dynamics of hand wheel actuator in steer-by-wire electric system of car is analysed. An existing model of a conventional electric power system is used to determine characteristic of the torque exerted at the steering wheel. This is followed by the creation of a hand wheel actuator model in order to examine and compare its characteristics with the reference model.

Keywords: hand wheel, actuator, steering