

Study of vehicle handling characteristics for four-wheel steer-by wire system

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ABSTRACT

The main purpose of this study focuses on the handling characteristics of vehicles with four-wheel steer-by-wire system. For getting rid of several limitations of the traditional steering system, this system can be used to stabilize the handling characteristics of vehicles with the handling strategy of stabilizing vehicles. In this handling strategy, it commands the front and rear steering angle with the objective of reference sideslip angle and yaw rate signals corresponding to the desired. Under this controlling system, vehicles can have not only the mobility at low speed but also the safety, maneuverability, and stability at high. This study analyzed the stabilities of dynamic vehicles mainly with the CarSim software, and also combined with the MATLAB/Fuzzy Logic Toolbox for improving the accuracy of dynamic vehicles imitation from CarSim. The construction of distributed steer-by-wire system experimental platform is based on CAN Bus technique, using LabVIEW to connect with the steer-by-wire system platform and the controller of steering motor to reach the second control interface, and also use the experimental platform to verify four-wheel steer-by-wire system. This study uses closed-loop to control the rear wheel steering direction depends on the vehicle's speed. As being at slow speeds, the rear wheels move in the opposite direction of the front wheels, while being at high speeds, the rear wheels move in the same direction as the front wheels. This study used cables and wheeling mechanism to design and implement the backup system, and also apply it to the experimental platform of steer-by-wire system. Because of the connection between cables and wheeling mechanism, the system can intervene to the steer-by-wire system as soon as possible when the steer-by-wire system was failed. And to let the driver to pull over the vehicle smoothly and then wait for rescue beside the road. Key words : Steer-by-wire System, Four-wheel-steering, Backup System, CarSim.

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