Study of Vehicle Stability Control for Four-wheel Steer-by-wire System

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ABSTRACT

The main purpose of the study focuses on the stability control of vehicle with four-wheel steer-by-wire system. Vehicles with four-wheel steer-by-wire system get rid of limitations of traditional steering system, which can be developed the vehicle stability control. In vehicle stability control, the commands front and rear steering angles with the objective of reference sideslip angle and yaw rate signals corresponding to the desired vehicle handling behaviour. Under this control system, the vehicle would have stable handling at high speed or low speed in cornering. The study used the CarSim software to verify the proposed method for the vehicle stability control.

The construction of distributed steer-by-wire system experimental platform based on CAN bus technique. Use the experimental platform to verify four-wheel steer-by-wire system. The study use of closed-loop control, the rear wheel steering direction depends on the vehicle speed, at slow speeds, the rear wheels move the opposite direction of the front wheels, while at high speeds, the rear wheels move in the same direction as the front wheels.

The controller features an active steering function which is aimed for optimal control of the front-wheel steering angle through variable steering gear ratio. At lower speeds, this technology reduces the amount that the steering wheel must be turned improving performance in situations such as parking and other urban area, while at higher speeds, the performance is such that steering becomes more responsive and provides improved directional stability.

Keywords : Steer-by-wire System、Four-wheel-steering、Vehicle stability control、Sideslip angle、CarSim

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