

An Approach to Neutral Steering of A 4wis Vehicle with Yaw Moment Control

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ABSTRACT

There are various Advanced Driver Assistance Systems (ADAS) available in the automotive industry which are developed to improve the safety of vehicles while driving. Vehicle stability system such as yaw moment control is one of ADAS that is common only on luxury vehicles with oversteer (OS) characteristics. However, the majority of vehicles in the market are designed with understeer (US) characteristics. The yaw rate of the vehicle increases gradually at low speed and can easily maneuver during cornering. The vehicle becomes uncontrollable especially for novice drivers when the yaw rate saturates at a certain level during high-speed cornering. Differential drive method as yaw moment control system has low precision as it shares the same function for the longitudinal stability control system. In this paper, we proposed four-wheel independent steering (4WIS) to improve the yaw moment of an understeer test vehicle. A steady-state cornering (SSC) simulation was performed to obtain the steering characteristic of a test vehicle. The yaw rate for the test vehicle is linearized to create a state-space linear model in the simulation. Then, SSC simulations were repeated with the 4WIS input is obtained by a PID control and the state-space as the reference value. The results show that the 4WIS system was able to improve the maneuverability of the understeer vehicle, especially at high speed by shifting the yaw rate from US to a neutral steer characteristic.

KEYWORDS: ADAS, 4WIS, PID control system, Yaw moment control, Neutral steering

DOI: https://doi.org/10.1007/978-981-19-2095-0_39

ACKNOWLEDGEMENTS

This research was supported by the Ministry of Higher Education Malaysia through the Fundamental Research Grant Scheme FRGS/1/2019/TK08/UMP/02/5. Special thanks to Automotive Engineering Center, Universiti Malaysia Pahang for providing laboratory facilities and technical support.

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