Hardware-in-the-Loop Simulations and Experiments of Vehicle Dynamic Control Technique

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ABSTRACT

The main subject of this study was focused on developing the ESP (Electronic Stability Program) control system. The software CarSim was used to simulate the vehicle being controlled, and fuzzy control theory was used to design it ’ s controller. Before the controller was designed, the over-steering and under-steering of vehicle must be discussed. In this study, the controller commanded the front outer wheel to brake in the condition of over-steering, and commanded the rear inner wheel to brake in the condition of under-steering. At last, being cooperated with skid control of ABS (Anti-lock Brake System), the optimum stable effect was reached. The Hardware-in-the-Loop (HIL) was constructed by a set of brake system of whole vehicle. Through CAN-bus, the sensor and actuator on the platform was connected. The controller was designed according to different skid control. At last, the conditions of dry and wet road were defined to simulate the action of ABS to accomplish the purpose of Hardware in the Loop.

Keywords : ESP, Over-Steering, Under-Steering, Skid Control, ABS, CAN-bus, Fuzzy Control

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