The Study of Hardware-in-the-Loop for a Vehicle Stability Control System and Verification Experiments by Real Car

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ABSTRACT

This thesis is to develop a vehicle dynamic control system in passenger car using the tradition brake system and to build a vehicle model for the experimental car (Ford Focus) in CARSIM, in order to analyze the tire interference of the car when it is out of control. In this study, we carry out hardware-in-the-loop (HIL) experiments. At first, we measure the environment data by CARSIM RT, and then send them to the ESP Controller to generate the braking control signals. The braking control signals are later sent to the MK60 brake system via the CAN BUS. After controlling the MK60 brake system, the brake pressure response is measured and sent to CARSIM RT. In this study, we develop the ESP Controller used to control the brake pressure in Simulink. By using the genetic algorithm (GA), we can find the optimal membership functions of the fuzzy controller. After developing the ESP Controller, it is connected to CARSIM RT and MK60 braking control system for doing the experiment of HIL to verify the stability of the ESP Controller.

Keywords : brake controller ; fuzzy controller ; ESP ; HIL ; real-car experiment

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