Hardware-in-the-Loop simulation and road running test of vehicle ABS control technique

張翔棋、陳志鏗

Abstract

This research established an ABS (Anti-lock Braking System) controller by Hardware-in-the-Loop implemented simulations. With CarSim software for verification of the vehicle brake system. Control parameters were adjusted online by using genetic algorithm (GA). The vehicle pressure and solenoid valves control signals were received and transferred by CAN-bus. MotoTron was used for vehicle model and brake controller to simulate the dynamic tire-ground forces acting on vehicle during braking. Two controllers were designed with the feedback of slip ratio and vehicle pressure, respectively. They were tested on high, medium, low and split friction road surfaces to evaluate the brake control performance. Running tests were performed with a real vehicle in ARTC. Standard proving grand the results of Hardware-in-the-Loop and designed vehicle controller were compared to adjust the parameter of the fuzzy controller to shorten the braking distance and time on various road surfaces.

Keywords: Hardware in the loop, Anti-lock Braking System, CAN-bus, Vehicle Dynamics, Fuzzy control, Vehicle Road Running Test