Simulation and Test Analysis Study for Drive-by-Wire Vehicle Front Anti-Collision Controlled System

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ABSTRACT

The purpose of this study is to integrate the methodologies for simulation by object-oriented program and By-Wire control for the vehicle Front Anti-Collision Control (FACC) system. The objective of this study focuses on the control of FACC system active braking and accelerating so that the FACC vehicle can maintain the safe distance with the preceding vehicle. The relative velocity and distance between the FACC and preceding vehicle are the inputs for the Fuzzy Logic Collision (FLC) controller, while the different safety algorithm calculations can be applied to assure the safe distance is maintained. Simulation for different vehicle acceleration and deceleration conditions can be established to test the FACC system electronic throttle and active braking dynamic response under safe vehicle speed specifications. This study established the vehicle dynamic model from the combination of first-order transfer functions which can simulate vehicle response faster. The results were compared with vehicle dynamic simulation software CarSim to assure the safe requirement under different driving and handling conditions for the FACC vehicle. When the expected dangers are introduced in the simulation, the program simulated vehicle response speed and result for whether or proportion for active braking were justified to validate the controller parameter set up for both straight and turning drive conditions. The FACC system specifications from ISO 15622 and SAE J2399 standards were compared to check the controller output performance. The result from the simulation showed the FACC vehicle with FLC can satisfy both ISO and SAE safe requirements under different driving conditions.

Keywords : Vehicle Front Anti-collision Controlled System、Fuzzy Logic Control、 Active Brake Control、Powertrain System Simulation

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