Application of the Brake by Wire System for Adaptive Cruise Control System

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ABSTRACT

This study established the integration technology and methodology for vehicle Adaptive Cruise Control (ACC) active brake control subsystems. Experimental data including the brake pedal position and force, master and slave cylinder pressure and travel were incorporated to build and to validate the active brake system dynamic model developed by object oriented software Matlab/SimulinkR. The brake system dynamic simulation model was integrated to the vehicle longitudinal dynamic program to calculate the vehicle deceleration response to the active brake and driver brake command. The slave cylinder brake pressure from each wheel simulated and measured can then be used to calculate the resulting brake force and the corresponding vehicle deceleration which can be later validated. The developed vehicle dynamic model considered the variation of brake force of the front and rear wheels in ACC vehicle. Since the ACC system requires vehicle follow the preceding vehicle with a safe distance on either straight line or turning drive condition, the active brake and radar signal must integrated to assure their performance can satisfy the requirement of ISO 15622 ACC system standard. This integration methodology can reduce the time and expanse for establishing the research and development capacity for ACC system and active brake controller thus increase the vehicle safety and reliability.

Keywords : Adaptive Cruise Control, Brake by wire, Active Brake Control

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