The study of anti-lock brake system via hardware-in-the-loop simulation

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ABSTRACT

This thesis is to derive a mathematical model of vehicle motion, which contains the vertical movement, as well as the hydraulic model and a single tire rolling condition of vehicles when braking, the dynamic tire force effects for the whole body situation. For the mathematical model derived in the context, this study discusses the vehicle braking control performance using the brake controller. The difference between the vehicle speed and the wheel speed is calculated as slip ratio. The error between the reference and real slip ratio is feed back to the PID controller for the control process. Different road conditions, e.g. wet or dry road surfaces, are used to evaluate the controller performance. Simulations show that this controller can effectively shorten the brake time and stopping distance. This research uses the concept of hardware in the loop simulation. Controller and brake test platform is integrated through the actual brake hydraulic system design with the predefined model. Simulation and HIL are compared to confirm the designed controller, and to reduce the error between simulation and experiment.

Keywords : ABS(Anti-lock Braking System)、braking controller

Table of Contents

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