An Experimental Study on Impact of Hard Damper Setting on ABS-Braking Performance Through Brake Pressure Changes Under Rough Road Conditions

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AN EXPERIMENTAL STUDY ON IMPACT OF HARD DAMPER SETTING ON ABS-BRAKING PERFORMANCE THROUGH BRAKE PRESSURE CHANGES UNDER ROUGH ROAD CONDITIONS

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In this study, the effects of hard damper setting on ABS braking performance have been experimentally investigated by taking brake pressure changes as a reference. For this aim, ABS tests have been conducted under wet and slippery rough road conditions by using medium-hard and hard dampers. In order to assess the test results, three braking maneuvers are considered. Test results show that hard damper setting improves ABS-braking performance under slippery road condition, while it deteriorates with wet road condition because of brake pressure oscillations occurring in vehicle body, axle and brake pressure pumping resonances. For this reason, the hard setting causes the bad braking performance during transition from slippery to wet road conditions.

Keywords: ABS; Brake pressure; Braking; Hard damper.

1. INTRODUCTION

The purpose of antilock brake system (ABS) is to keep the tire-road contact at maximum rate during braking by preventing the wheel-locking during braking-induced load transfer. Maximum effective braking can occur when the retarding force on wheel matches the grip imposed between tire and road surface (Austin and Morrey, 2000). If the retarding force is too great, the load on wheel will be insufficient to keep the wheel-rolling. This causes the wheel to lock and skid. During deceleration of a passenger vehicle, there is a load transfer from the rear axle to the front axle. This load transfer leads to instability. This is particularly important situation when braking occurs at the same time that a vehicle is steered to one side (Kalagatla et al., 1996). The objective of suspension is to improve the ride quality and keep the tire-road contact at maximum level under the conditions such as braking, acceleration, and turning. Therefore, ABS has exploited from the tire-road contact provided by suspension system. For these reasons, recently, there are...