

## **Wheel Slide Protection System Using Tangential Force in the Macro Slip Area**

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Almost all recent railway vehicles have the brake system by the use of the tangential force between rails and wheels. It is difficult to stabilize the braking performance and to prevent wheel damage because the tangential force is influenced by various conditions, such as climate, contact surfaces of rails and wheels, etc.. The wheel slide protection system (WSP) is one of the useful approaches used in many vehicles. However, in the existing WSPs, braking force is controlled on the basis of the limited information derived from the rotational speed of the wheel. Therefore, they do not always demonstrate optimal control in response to tangential force varying frequently. In this study, we propose a new WSP in which the quality of the tangential force by the brake cylinder pressure during wheel slips can be judged. Furthermore, we verified the advantage of the new approach by bench tests. As a result, the application of the proposed method reduced the loss of braking performance.