

Skid Control of a Small Electric Vehicle With Two In-Wheel Motors: Simulation Model of ABS and Regenerative Brake Control

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ABSTRACT

Due to the space limitation at the driving tyre, some of the small electric vehicles (EVs) with two in-wheel motors employed a mechanical braking system rather than the hydraulic braking system. Although the mechanical braking system is compact, its rigidness and the response performance are lower than the hydraulic braking system. In this paper, we propose a combination of anti-lock braking system (ABS) and regenerative brake control to improve the braking performance of the small EVs. The hydraulic unit of ABS is installed at the front tyre, while an in-wheel motor at the rear tyre will be an actuator of ABS to control the regenerative braking torque at the rear tyre. During braking on an icy road, the operational of ABS and regenerative brake control can prevent the tyre lock and vehicle from skidding. The simulation result shows that our proposed model can improve the safety and stability of the vehicle.

KEYWORDS: Skid control, anti-lock braking system (ABS), regenerative brake, in-wheel motor, small electric vehicles

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