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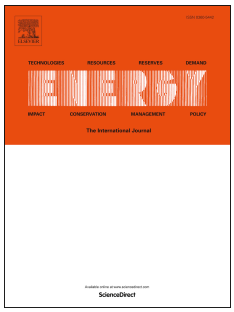


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Chengqun Qiu, Guolin Wang, Mingyu Meng, Yujie Shen

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# A novel control strategy of regenerative braking system for electric vehicles under safety critical driving situations

Chengqun Qiu[a,b,*], Guolin Wang[a], Mingyu Meng[c], Yujie Shen[d]

[a] *School of Automotive and Traffic Engineering, Jiangsu University, Zhenjiang 212013, China*

[b] *School of Clean Energy and Electrical Engineering, Yancheng Teachers University, Yancheng 224007, China*

[c] *Interdisciplinary Graduate School of Science & Engineering, Tokyo Institute of Technology, Yokohama 2268502, Japan*

[d] *Department of Electrical and Electronic Engineering, Faculty of Engineering, University of Bristol, Bristol BS8 1UB, UK*

Abstract

This paper mainly focuses on control strategy of the regenerative braking system of an electric vehicle under safety critical driving situations. With the aims of guaranteeing the electric vehicle stability in various types of tire-road adhesion conditions, based on the characteristics of an electrified powertrain, a novel control strategy of regenerative braking system is proposed for electric vehicles during anti-lock braking procedures. Firstly, the main construction of the case-study electric car with regenerative braking system is introduced. Next, based on the phase plane theory, the optimal brake torque is calculated for ABS control of an electric vehicle. Then, an allocation control, wherein the required optimal brake torque is divided into two parts that are disposed respectively by the friction and regenerative brakes, is discussed. In addition, two parameters for evaluating regeneration braking energy efficiency contribution while in the deceleration braking process are defined. Furthermore, a novel regenerative braking control strategy named “serial control strategy” is proposed. Finally, the road tests are implemented in four types of tire-road adhesion conditions under safety-critical driving situations. The test results validate the effectiveness and feasibility of the proposed control strategy.