

Mechanism and Countermeasure of Wheel Tread Thermal Cracking

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Focusing on the durability of railway wheels, tread thermal cracking, one of severe damages on the tread surface, was investigated to understand its mechanism and to develop the countermeasures against thereto. We have conducted a combination of full-scale dynamometer experiments, numerical analysis and material investigation in order to form a hypothesis about the cracking mechanism. Based on it, we carried out a series of hypothesis verification experiments. As a result, we have clarified that the main cause of tread thermal cracking is residual stress induced by tread braking and wheel/rail tangential force. The criteria of thermal cracking can be calculated as a function of wheel maximum temperature and equivalent tangential force corresponding to the vehicle acceleration/deceleration on the basis of vehicle specifications.