Evaluation Method for Flange-Climb Derailment Focusing on Contact Position and Transverse Creepage Between Wheel and Rail

Shoya KUNIYUKI Kimihiko NAKANO

This paper proposes a new method for evaluating the running safety of railway vehicles against flange-climb derailment, focusing on the contact conditions between wheel and rail. The method uses two key variables: lateral contact position and normalized transverse creepage, defined as the ratio of transverse creepage to the wheelset angle of attack. Through vehicle dynamics simulations under various running conditions, the relationship between these variables and the running safety was investigated. The results show that the transit domains for the loci of these variables differ significantly between derailment and non-derailment cases. This paper provides fundamental insights into the development of advanced safety assessment techniques for railway operations, taking into account the detailed wheel-rail contact dynamics.