

PROCEEDINGS**Impact of the Railway Vehicle Characteristics in Its Runnability in the Presence of Strong Winds****Pedro Montenegro^{1,*}, Raphael Heleno², Hermes Carvalho², Diogo Ribeiro³, Rui Calçada¹ and Chris Baker⁴**

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ABSTRACT

This work consists of evaluating the impact of the most relevant characteristics of railway vehicles, namely geometric, mechanical and aerodynamic properties, in their runnability in the presence of strong winds, more precisely in the risk of derailment. Such objective is achieved by performing several dynamic with a non-linear vehicle-structure interaction model developed by the authors [1,2] and used in other works in this field [3,4], which allows the evaluation of the wheel-rail contact forces and, consequently, the unloading index, as suggested by the European Norm EN 14067-6 [5]. The calculations are carried out for several scenarios characterized by different train and wind speeds. The wind is simulated with a stochastic model that allows the generation of turbulent wind time-histories based on power spectral density functions. The reference vehicle adopted in this work corresponds to the European InterCity Express 3 (ICE-3) train, whose original properties were parameterized to evaluate their influence in the vehicle's stability. This parametric study focuses on the variation of several properties of the vehicle that may influence its dynamic behavior against crosswinds, namely the carbody mass, height of the gravity center, aerodynamic coefficients, and stiffness and damping of the suspensions. Apart from the suspensions' properties, which prove to have a negligible influence in the vehicle's stability, the remaining parameters have a significant impact in the running safety against crosswinds.

KEYWORDS

Train running safety; stochastic wind model; railway vehicle properties; high-speed railways; train-track interaction

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