

عنوان مقاله:

Influence of Marshalling Length on Aerodynamic Characteristics of Urban Emus under Crosswind

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خلاصه مقاله:

Urban electric multiple units (EMUs) is based on high-speed trains and metro vehicle technology. Their design speeds are generally from 160km/h to 200km/h, which mitigates the low operating speeds of metro vehicles. Traditional crosswind calculations for the aerodynamic characteristics of trains often assume a 3-marshalling train. Urban trains are generally 4-marshalling and 6-marshalling. Evaluating the aerodynamic characteristics of urban EMUs of different marshalling lengths is instructive for system design. Based on CFD, aerodynamic models of urban trains are established. The train models include 3-marshalling, 4-marshalling and 6-marshalling. The aerodynamic characteristics of 200km/h urban trains subject to different crosswind velocities are numerically simulated. The research display that the aerodynamic performance of the head-car and the first middle-car, under the same crosswind velocity, of different marshalling lengths, are almost the same, whereas the aerodynamic characteristics of the tail-cars for different marshalling lengths are significantly different. The side forces of the 4 middle-cars of the 6-marshalling train decrease, sequentially. At a crosswind velocity of 35m/s, 34% difference in F_s of the tail-car of a 6-marshalling train compared to a 3-marshalling, and the overturning moment differs by 22.8%. Because of the significant difference in side force and overturning moment, the three-marshalling train model cannot represent the real train. Therefore, the real marshalling length should be used, as far as possible, when studying crosswind effects on the train.

کلمات کلیدی:

Crosswind, Marshalling length, Train aerodynamics, Urban trains, Numerical simulation

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