Numerical characterization of real railway overhead cables

C. Sanchez-Rebollo, E. Vélez, J.R. Jiménez-Octavio

Abstract— This paper presents a numerical characterization of real railway overhead cables based on computational fluid dynamics (CFD). Complete analysis of the aerodynamic coefficients of this type of cross section yields a more accurate modelling of pressure loads acting on moving cables than provided by current approaches used in design. Thus, the characterization of certain selected commercial cables is carried out in this work for different wind speeds and angles of attack. The aerodynamic lift and drag coefficients are herein determined for two different types of grooved cables, which establish a relevant data set for the railway industry. Finally, the influence of this characterization on the fluid-structure interaction (FSI) is proved, the static behavior of a catenary system is studied by means of the finite element method (FEM) in order to analyze the effect of different wind angles of attack on the stiffness distribution.

Index Terms— aerodynamic characteristics; overhead catenary line; CFD simulation; cable; lift force