Asociación Argentina
de Mecánica Computacional

Mecánica Computacional Vol XXXIX, págs. 103-103 (resumen)
F.E. Dotti, M. Febbo, S.P. Machado, M. Saravia, M.A. Storti (Eds.)
Bahía Blanca, 1-4 Noviembre 2022

UNCERTAINTY QUANTIFICATION ANALYSES OF OVERHEAD TRANSMISSION LINES WITH CROSS ROPE STRUCTURES AND THE IMPLEMENTATION OF A REDUCED SIZE NEW MODEL

Bruno J. Rango and Marta B. Rosales

Department of Engineering, Universidad Nacional del Sur, Alem 1253, 8000 Bahía Blanca and IFISUR (UNS-CONICET), Argentina, bruno.rango@uns.edu.ar, mrosales@criba.edu.ar

Keywords: Transmission lines, Cross rope tower, stochastic wind load, uncertainty quantification

Abstract. The present article is part of a project related to the evaluation of the structural behavior of Overhead Transmission Lines (OTL) with Cross-Rope (CR) supporting towers. This matter is of great importance for the Argentinian energy transmission grid, given that CR towers were adopted as the type of structures to be used in all the new overhead transmission projects, starting in 2006. The representation of the real-world continuum OTLs as a single supporting tower surrounded by two adjacent conductor spans with pinned connections at their outermost ends, is among the most usual simplifications for the construction of computational models. The authors apply that same framework to an OTL with CR structures in order to perform uncertainty quantification (UQ) analyses under dynamic wind load fields. The results of these studies are presented. Then, the model hypotheses are revisited: with the purpose of defining a more realistic representation of the continuum OTL, the former pinned connection hypothesis at the ends of the cable spans is disregarded and, instead, elastic boundaries are applied. Moreover, the real-world continuity among OTLs segments is brought into consideration in this new model through the definition of periodic boundary conditions. The performance of this novel modelling approach is compared to that of the former model, and a series of relevant differences are shown. The authors conclude that this new scheme constitutes a reasonable tradeoff between computational demand and representativity of the real structure and, thus, is very appropriate for the implementations of parametric and UQ studies.