Asociación Argentina
de Mecánica Computacional

Resúmenes de Mecánica Computacional Vol II, pp. 37-37
A. Caggiano, G. Etse, P. Folino, M. Goldschmit, M. Pucheta, M. Storti (Eds.)
J. Ballaben, D. Felix, R. Jaca (Issue eds.)
Buenos Aires, November 11-14, 2025

NUMERICAL MODELING OF A HIGH-VOLTAGE TRANSMISSION TOWER: DAMAGE ASSESSMENT AND REHABILITATION PROPOSAL

Javier L. Mroginski[a], Hugo G. Castro[a], Juan M. Podestá[a] and Rodrigo Paz[a,b]

[a]*Laboratorio de Mecánica Computacional, Universidad Nacional del Nordeste LAMEC - IMIT (CONICET), Av. Las Heras 727, 3500 Resistencia, Chaco, Argentina, javierm@ing.unne.edu.ar*

[b]*ANSYS Inc, Livermore, CA, USA*

Keywords: Structural damage assessment, Embedded FE, ICFD LS-DYNA

Abstract. The numerical modeling of real structures and buildings, located in specific sites and subjected to natural effects, allows for the evaluation of their mechanical behavior under different loading and deterioration conditions over time. This study focuses on assessing the damage sustained by an 86 m tall steel tower used in high-voltage power transmission lines, and on proposing effective rehabilitation solutions aimed at extending its service life. Using finite element analysis tools, both the current state of the structure and the projected rehabilitated state are simulated, considering factors such as foundation displacements, excessive deformations, and loss of load-bearing capacity in critical members, as well as design loads, wind, self-weight, etc. The results obtained make it possible to identify plastified areas that correspond to damaged members, indicating that the numerical model accurately predicts the damage experienced by the structure. Based on this diagnosis, reinforcement and rehabilitation strategies are proposed, including component replacement, the addition of structural elements, or the use of composite materials to strengthen damaged sections. This approach ensures an extended service life for the tower, enhances the operational safety of the electrical system, and optimizes costs compared to a full replacement. Numerical modeling thus emerges as a key tool for technical decision-making in the management of electrical infrastructure that is aging or deteriorated under demanding environmental and operational conditions.

ISSN: 3072-7723 DOI: 10.70567/rmc.v2.ocsid8480