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ENGINEERING FOR EVOLUTION

November 27 28 29

ICEUBI2019

University of Beira Interior

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ISSN 2183-9891

BOOK OF ABSTRACTS

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Covilhã (Portugal), November 27-29, 2019

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Engineering for Evolution

Parametric Study of Lateral Loaded Piles by Computational Modeling

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Abstract

Since soils are heterogeneous materials and the survey methods are based on insufficiently representative soil samples, there are several variables involved and less reliability in estimating the load capacity of the structures. So that, it is necessary to keep verifying the validity of stress and displacement method analysis in order to achieve results with more precision. In this sense, the objective of this study was to develop a two-dimensional computational analysis of the axial and transverse (simultaneous) loading effects on isolated, bored and reinforced concrete piles. In addition, different types of soil, piles dimensions, soil stratigraphy, drainage conditions and soil mechanical parameters were considered as variables of this study. Thereby, the axial load capacity of piles was verified by the method of NAVFAC DM 7.2, the settlement by the methods of Poulos & Davis (1980) and Masopust (1994), and the distribution of horizontal forces and displacements by the p-y method, based on the horizontal reaction modulus obtained from the theoretical approaches by Bowles (1997), Vesic (1977), CSN 73 1004, Pochman & Simek (1989) and Matlock & Reese (1956). Regarding to the distribution of lateral stresses and displacements by the p-y method, no interference on results was observed due to change of friction angle, cohesion, coefficient of lateral earth pressure and soil drainage conditions. In addition, it was concluded that the horizontal forces and displacements are more dependent on the diameter than the length of piles.

Keywords

Computational analysis of piles, Lateral loading, Distribution of horizontal stresses, Distribution of lateral displacements

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