

Local Seismic Response Analysis Based On the Non-Linear Soil Behavior. Application to 5 Essential Buildings in Santiago de los Caballeros.

Rafael Marmolejos¹, Claudia Germoso², Alnura Omarbekova³

¹Universidad Politécnica de Cartagena (UPCT)

Plaza Cronista Isidro Valverde, 30202 Cartagena, Murcia, España.
rafael_margo@hotmail.com

²Instituto Tecnológico de Santo Domingo (INTEC)

Av. Los Próceres, Jardines del Norte, Santo Domingo, República Dominicana
claudia.germoso@intec.edu.do

³International Information Technology University.

Manas St 34/1, Almaty, Kazajistán
a.omarbekova@edu.iitu.kz

Extended Abstract

The Dominican Republic is located on the edge of the Caribbean tectonic plate, where there is significant seismic activity, which makes it an island of high seismic hazard [1]. The North region is the one with the greatest risk of earthquakes compared to the other regions of the Dominican Republic, due to the tectonic faults that cross it and that have a great capacity to cause telluric movements of up to 8.6 degrees on the Richter scale. The municipality of Santiago de los Caballeros is the second largest municipality in the Dominican Republic and the largest in the region. Due to this high seismicity in the northern zone, this project studies the non-linear soil behavior of 5 important public buildings in the city of Santiago, among which are: schools, hospitals and government buildings. These structures represent the essential buildings that must be maintained with good behavior at the time of a seismic event. The objective is to evaluate the local seismic response, through a clearly non-linear soil analysis, based on the hyperbolic model of MKZ (Matasovic-Konder-Zelasko) [2]. It is intended to estimate the behavior that these structures will have against different earthquakes and probabilities of exceedance, which will allow us to deduce if the appropriate local considerations are being followed in the design of this type of structure, based on the seismic hazard of the area. The results is reflected in response spectra and time histories on the ground surface for different earthquakes and for each return period. It was observed that the response is strongly influenced not only by the geology of the local site, but also by the characteristics of the input movements themselves. The results of spectral accelerations at the surface compared to the regulations in the Dominican Republic [3] show significant differences, thus, the results of this study show higher values in the design spectrum for a range of periods, which is around 0.1 - 1 seconds. Based on this study and the characteristics of the structures found on the site, it will allow us to conclude if it presents any seismic risk and if the necessary considerations are being taken in the structural design.

References

- [1] De León, O. (2002). Riesgo sísmico en la República Dominicana. In Riesgo sísmico en la República Dominicana (pp. 5-5).
- [2] Kondner, R. L., and Zelasko, J. S. (1963). "A hyperbolic stress-strain formulation of sands." Proc. 2nd Pan Am. Conf. on Soil Mech. And Found. Engrg., Brazilian Association of Soil Mechanics, Sao Paulo, Brizil, 289-324
- [3] R-001 (2011). Reglamento para el Análisis y Diseño Sísmico de Estructuras. Dirección General de Reglamentos y Sistemas. Ministerio de Obras Públicas y Comunicaciones. Rep. Dom.