Vicente Mercado

Associate Professor
Department of Engineering
Indiana Wesleyan University, Marion, IN, 46953
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EDUCATION

- **Ph.D. in Civil Engineering**
  Rensselaer Polytechnic Institute, Troy, NY, USA
  Graduation date: May, 2012
- **Specialization in Applied Statistics**
  Universidad del Norte, Barranquilla, Colombia
  Graduation date: September, 2008
- **B.S. in Civil Engineering**
  Universidad del Norte, Barranquilla, Colombia
  Graduation date: March, 2007

RESEARCH EXPERIENCE

- Geotechnical earthquake engineering.
- Numerical modeling of geotechnical systems.
- Implementation of soil constitutive models.
- Implementation of system identification techniques for determination of geotechnical properties.

RELEVANT WORK EXPERIENCE

- **Indiana Wesleyan University, Associate Professor**
  July2025-present. Marion, IN, USA
- **Universidad del Norte, Associate Professor**
  March 2022–July2025. Barranquilla, Colombia
- **Universidad del Norte, Assistant Professor**
  July 2014– March 2022. Barranquilla, Colombia
- **Rensselaer Polytechnic Institute, Postdoctoral Research Assistant**
  May 2012– July 2014. Troy, NY, USA
- **Rensselaer Polytechnic Institute, Adjunct Professor**
  August 2012– December 2012. Troy, NY, USA

PUBLICATIONS

Journal Articles

Mercado, V., Ayala, N. and Duque, J., 2025. A system identification technique for the estimation of the bulk modulus based on pore water pressure dissipation records. *Soil Dynamics and Earthquake Engineering*, *194*, p.109345.

Raja, M.N.A., Mercado, V., Abdoun, T. and El-Sekelly, W., 2025. Seismic site amplification prediction-an integrated Bayesian optimisation explainable machine learning approach. *Georisk: Assessment and Management of Risk for Engineered Systems and Geohazards*, pp.1-20.

Mercado, V., Duque, J. and El-Sekelly, W., 2024. Numerical modeling of LEAP-2022 dynamic centrifuge tests adopting a multi-surface plasticity model. *Soil Dynamics and Earthquake Engineering*, *181*, p.108674.

El-Sekelly, W. and Mercado, V., 2024. Practical considerations in liquefaction numerical simulations calibrated with historical data. *Soil Dynamics and Earthquake Engineering*, 180, p.108608.

Mercado, V., Díaz-Parra, F.J., Pajaro, C.A., Montejo, J., Posada, G., Arcila, M. and Arteta, C.A., 2024. Performance evaluation of parameters as estimators of seismic site effects in northern South America. *Soil Dynamics and Earthquake Engineering*, 180, p.108584.

Lascarro, C., Ochoa-Cornejo, F., Mercado, V. and Duque, J., 2024. An extended hypoplastic model for sands with additions of highly plastic fines formulated under the ISA framework. *Soil Dynamics and Earthquake Engineering*, 176, p.108348.

Mercado, V., Pajaro, C.A., Arteta, C.A., Díaz, F.J., Montejo, J., Arcila, M. and Abrahamson, N.A., 2023. Semiempirical model for the estimation of site amplification in Northern South America. *Earthquake Spectra*, 39(2), pp.1109-1139.

Bracamonte, A.J., Mercado, V., Martínez-Arguelles, G., Pumarejo, L.F., Ortiz, A.R. and Herazo, L.C.S., 2023. Effect of Finite Element Method (FEM) Mesh Size on the Estimation of Concrete Stress–Strain Parameters. *Applied Sciences*, 13(4), p.2352

Arteta, C.A., Pajaro, C.A., Mercado, V., Montejo, J., Arcila, M. and Abrahamson, N.A., 2023. Ground-Motion Model (GMM) for Crustal Earthquakes in Northern South America (NoSAm Crustal GMM). *Bulletin of the Seismological Society of America*, 113(1), pp.186-203.

Hernandez, F., Astroza, R., Beltran, J.F., Zhang, X. and Mercado, V., 2022. An experimental study of a cable-pulleys spring-damper energy dissipation system for buildings. *Journal of Building Engineering*, 51, p.104034.

Mercado, V., Fuentes, W. and Ochoa-Cornejo, F., 2022. Multiyield-Surface Implementation of a Simplified Three-Dimensional Hoek–Brown Strength Criterion. *International Journal of Geomechanics*, 22(3), p.06021039.

Arteta, C.A., Pajaro, C.A., Mercado, V., Montejo, J., Arcila, M. and Abrahamson, N.A., 2021. Ground-motion model for subduction earthquakes in northern South America. *Earthquake Spectra*, p.87552930211027585.

Walubita, L.F., Mercado, V., Lee, S.I., Fuentes, L. and Villegas, J.M., 2020. Exploration of a mechanistic model for the quantification of the resilient modulus using free-free resonant column testing. *Road Materials and Pavement Design*, pp.1-15.

Mercado, V., Ochoa-Cornejo, F., Astroza, R., El-Sekelly, W., Abdoun, T., Pastén, C. and Hernández, F., 2019. Uncertainty quantification and propagation in the modeling of liquefiable sands. *Soil Dynamics and Earthquake Engineering*, 123, pp.217-229.

Mercado, V., El-Sekelly, W., Abdoun, T. and Pájaro, C., 2018. A study on the effect of material nonlinearity on the generation of frequency harmonics in the response of excited soil deposits. *Soil Dynamics and Earthquake Engineering*, 115, pp.787-798.

El-Sekelly, W., Mercado, V., Abdoun, T., Dobry, R. and Sepulveda, A., 2018. Contraction and pore pressure behavior of a silty sand deposit subjected to an extended shaking history. *Soil Dynamics and Earthquake Engineering*, 114, pp.215-224.

Mercado, V., Nino, E.D. and Arteta, C.A., 2017. Dynamic Site Response Characterization Via Bayesian Inference: Analysis of the SGC Station Deposit in Bogota, Colombia. *Journal of Earthquake Engineering*, pp.1-22.

Cantillo, V., Mercado, V. and Pájaro, C., 2017. Empirical Correlations for the Swelling Pressure of Expansive Clays in the City of Barranquilla, Colombia. *Earth Sciences Research Journal*, 21(1), pp.45-49.

Mercado, V., El-Sekelly, W., Zeghal, M., Abdoun, T., Dobry, R. and Thevanayagam, S. 2016 Characterization of the Contractive and Pore Pressure Behavior of Saturated Sand Deposits under Seismic Loading. *Computers and Geotechnics* 82, pp. 223-236.

Mercado, V., El-Sekelly, W., Zeghal, M. and Abdoun, T. 2016 Identification of Soil Dynamic Properties of Sites Subjected to Bi-directional Excitation. *Soil Dynamics and Earthquake Engineering*, 92, pp. 215-228.

Mercado, V., El-Sekelly, W., Zeghal, M. and Abdoun, T., 2015. Identification of soil dynamic properties through an optimization analysis. *Computers and Geotechnics*, *65*, pp.175-186.

Abdoun, T., Gonzalez, M.A., Thevanayagam, S., Dobry, R., Elgamal, A., Zeghal, M., Mercado, V.M. and El Shamy, U., 2013. Centrifuge and large-scale modeling of seismic pore pressures in sands: Cyclic strain interpretation. *Journal of Geotechnical and Geoenvironmental Engineering*, *139*(8), pp.1215-1234.

El-Sekelly, W., Mercado, V., Abdoun, T., Zeghal, M. and El-Ganainy, H., 2013. Bender elements and system identification for estimation of V_S. *International Journal of Physical Modelling in Geotechnics*, *13*(4), pp.111-121.

Dobry, R., Thevanayagam, S., Medina, C., Bethapudi, R., Elgamal, A., Bennett, V., Abdoun, T., Zeghal, M., El Shamy, U. and Mercado, V.M., 2010. Mechanics of lateral spreading observed in a full-scale shake test. *Journal of Geotechnical and Geoenvironmental Engineering*, *137*(2), pp.115-129.

Book Chapters

Manzari, M., El Ghoraiby, M., Zeghal, M., Kutter, B., Arduino, P., Barrero, A., Bilotta, E., et al., 2020. LEAP-2017: Comparison of the Type-B numerical simulations with centrifuge test results. In *Model Tests and Numerical Simulations of Liquefaction and Lateral Spreading* (pp. 187-218). Springer, Cham.

Manzari, M., El Ghoraiby, M., Zeghal, M., Kutter, B., Arduino, P., Barrero, A., Bilotta, E., et al., 2020. LEAP-2017 simulation exercise: Calibration of constitutive models and simulation of the element tests. In *Model Tests and Numerical Simulations of Liquefaction and Lateral Spreading* (pp. 165-185). Springer, Cham.

PROJECTS

- **Development of attenuation models of alternative intensity measures and of seismic site amplification for Colombia.** (December 2021 – April 2023) Role: Principal-Investigator; direction of the project, geotechnical analysis for seismic hazard assessment. Funding: Colombian Geological Survey (SGC).

- **Development of prediction models of strong ground movement compatible with the seismicity of Colombia and Ecuador.** (July 2020 – March 2021) Role: Co-Investigator; geotechnical analysis for seismic hazard assessment. Funding: Colombian Geological Survey (SGC).

- **Baseline diagnostic of hydromorphological conditions and criteria analysis for the design, construction, operation and maintenance of navigability infrastructure of the Magdalena River.** (June 2020 – August 2020) Role: Consulting engineer; analysis of criteria for design, construction, operation and maintenance for water control structures. Funding: Cormagdalena, Colombia.

- **R+D in strategical hydrosystems in the Atlantico Department and network architecture for the environmental information of the Atlantico Department** (November 2014 - November 2015) Role: Co-Investigator; geotechnical assessment in coastal processes. Funding: Government of the Atlantico Department, Colombia.

- **Development of a Multi-scale Monitoring and Health Assessment Framework for Effective Management of Levees and Flood-Control Infrastructure Systems** (2011 - 2013) Role: Research Assistant. Funding: NIST/NSF, USA.