

Anthony F. Tessari, Ph.D., P.E.

Associate Professor

University at Buffalo

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NARRATIVE SUMMARY

Areas of research include full and large-scale testing of soil-foundation-superstructure interaction (SFSI) in a large laminar box; advanced sensing technologies, algorithms, and data acquisition techniques for field and high-gravity environments; and centrifuge modeling of levee and floodwall systems, blast testing, lateral spreading, and liquefaction. Evaluation metrics, beginning with publications include one new professional ASTM standard on bender elements released in 2019; thirteen peer reviewed journal articles published at UB, seven of which are with doctoral students; three articles in submission, two of which are under second review and one is an invited submission based on a popular conference paper, and five additional papers to be submitted in the next six months; four doctoral students graduated and one ongoing; six master's students graduated; total external funding of \$1,083,728 with self-share of \$819,641; organized and hosted the joint 2019 University of Tongji and University at Buffalo Geotechnical Graduate Student Forum; and recipient of 2017 SEAS Early Career Teacher of the Year award.

EDUCATION AND LICENSURE

Doctor of Philosophy, Civil Engineering December 2012
Rensselaer Polytechnic Institute, Troy, NY
Dissertation: Centrifuge Modeling of the Effects of Natural Hazards on Pile-founded Concrete Floodwalls
Adviser: Professor Tarek Abdoun
Co-adviser: Professor Inthuorn Sasanakul

Master of Science, Civil Engineering December 2007
Rensselaer Polytechnic Institute, Troy, NY
Thesis: Measurement of Primary and Secondary Wave Velocities on a Geotechnical Centrifuge Using Bender Elements

Adviser: Professor Tarek Abdoun

Bachelor of Science, Civil Engineering
Rensselaer Polytechnic Institute, Troy, NY

May 2006

Professional Engineer
New York State
License 093340

PROFESSIONAL HISTORY

Associate Professor	University at Buffalo Department of Civil, Structural, and Environmental Engineering	March 2022 – Present
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- Designed and commissioned high-temperature soil testing equipment for enhancing temperature dependent soil models for tunnels subjected to fire.

Assistant Professor	University at Buffalo Department of Civil, Structural, and Environmental Engineering	August 2013 – March 2022
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- Served on board of directors and as a core member of the Institute of Bridge Engineering.
- Performed large-scale research project funded by the US Department of Energy to identify wave passage for use in nuclear power site design a retrofit.
- Performed full-scale research project funded by the US Department of Energy to quantify sliding between a concrete foundation element and a sandy soil.
- Developed in-situ sensing technologies for 3D shear wave tomography in the large geotechnical laminar box.
- Commissioned a new cyclic triaxial testing system in the geosystems engineering laboratory.
- Commissioned a new resonant column and torsional shear testing system in the geosystems engineering laboratory.
- Developed new microscopy techniques for identifying roughness characteristics of granular media.
- Designed an offshore geotechnical engineering course focusing on the probabilistic evaluation of deep foundation soils and design optimization for offshore driven piles, caissons, micropiles, and suction caissons utilizing bridge case studies.

- Reintroduced a course on geotechnical earthquake engineering and soil dynamics that incorporates seismology, probabilistic seismic hazard analysis, dynamic properties of soil, and modern design methodologies.

Geotechnical Research Engineer, Geotechnical Centrifuge Research Center Rensselaer Polytechnic Institute and the Network for Earthquake Engineering Simulation November 2007 – August 2013

- Designed and assisted in commissioning major experimental equipment and upgrades to the geotechnical centrifuge facility, including: the in-flight 2-Dimensional Earthquake Simulator, which is capable of reproducing seismic events with less than 2% RMS error; the Force-controlled 2D Robotic Z Loading System, with maximum axial capacity of 50 kN; and several data acquisition system upgrades that tied in advanced sensing capabilities.
- Designed and installed upgrades to the 4-DOF In-flight Robot, which include an upgraded cone penetrometer, T-bar full-flow penetrometer, and biaxial load arm. The modifications have been used extensively in several high-profile research projects.
- Assisted in the development and implementation of an NSF TUES Type 1 Project, “A Multi-Institutional Classroom Learning Environment for Geotechnical Engineering Education,” for undergraduate soil-mechanics students with Prof. T. Abdoun (Co-PI) at Rensselaer Polytechnic Institute, Prof. U. El-Shamy (PI) at Southern Methodist University, and Prof. M. Pando (Co-PI) at University of North Carolina Charlotte.
- Supported over 10 NEES and 4 Non-NEES major research projects.
- Managed and co-advised over 25 individual undergraduate researchers, many of whom went onto graduate studies at institutions including RPI, MIT, and UC Berkeley.
- Developed methods for the adaptation of tactile pressure sensors to the centrifuge environment, which include preparation and calibration procedures for static and dynamic events in dry and saturated environments.
- Member of an international consortium that is designing and specifying next-gen subminiature pore water pressure sensors.
- Commissioned and implemented several upgrades to the centrifuge data acquisition hardware and software. Worked closely with Bloomy Control Systems to implement a Centrifuge DAQ Software suite, which has been generalized and adopted by the US Army Corps of Engineers Centrifuge Facility, the KAIST Centrifuge Facility, and is part of a few proposals for new facilities.
- Organized sessions for three international centrifuge workshops (RPI & UC Davis joint ventures).

- Managed two full time staff engineers (mechanical and electrical) and two full time IT personnel while ensuring efficient and effective use of the research equipment.
- Balanced budget and prepared financial reports for CEES facility, which encompasses approximately \$1.9M of funded research per year.
- Supervised 4 internal graduate student researchers and 14 undergraduate researchers on several projects.
- Supported NEES shared-use time by scheduling two external researchers for centrifuge experiments.
- Prepared supplemental funding proposal for equipment upgrades; received \$80,000 for high-speed tactile system upgrade.
- Oversaw development of dynamic retrofit and testing of the three-piece split-box testing container.

SCIENTIFIC PUBLICATIONS

*Current citation data available at scholar.google.com/citations?user=owHPoN8AAAAJ
Graduate advisee(s), if applicable, are underlined and bolded if published or under review.*

- **Industry Standards**

S1. ASTM Standard D18-8295 (2019). Measurement of shear wave velocity in geotechnical laboratory specimens using bender elements.

- **Refereed Journal Articles**

J1. **Hua, N.**, Elhami-Khorasani, N., & Tessari, A. (2022). Numerical modeling of the fire behavior of reinforced concrete tunnel slabs during heating and cooling. *Engineering Structures*.

J2. Forcellini, D., & Tessari, A. (2022). Numerical assessment of the loading factors affecting liquefaction-induced failure. *Geosciences*, 12(3), 123.
<http://doi.org/10.3390/geosciences12030123>

- J3. **Hua, N.**, Tessari, A., & Elhami-Khorasani, N. (2022). The effect of geologic conditions on the fire behavior of tunnels considering soil-structure interaction. *Tunneling and Underground Space Technology*, 122, 104380. <https://doi.org/10.1016/j.tust.2022.104380>
- J4. **Hua, N.**, Elhami-Khorasani, N., Tessari, A., & Ranade, R. (2022). Experimental study of fire damage to reinforced concrete tunnel slabs. *Fire Safety Journal*, <https://doi.org/10.1016/j.firesaf.2021.103504>.
- J5. Gu, X., Wu, D., Zuo, K., & Tessari, A. (2022). Centrifuge Shake Table Tests on the Liquefaction Resistance of Sand with Clayey Fines. *Journal of Geotechnical and Geoenvironmental Engineering*, 148(2), 04021180. [https://doi.org/10.1061/\(ASCE\)GT.1943-5606.0002708](https://doi.org/10.1061/(ASCE)GT.1943-5606.0002708).
- J6. Gu, X., Zuo, K., Tessari, A., & Gao, G. (2021). Effect of saturation on the characteristics of P-wave and S-wave propagation in nearly saturated soils using bender elements. *Soil Dynamics and Earthquake Engineering*, 145, 106742. <https://doi.org/10.1016/j.soildyn.2021.106742>.
- J7. **Hua, N.**, Tessari, A., & Elhami-Khorasani, N. (2021). Characterizing damage to a concrete liner during a tunnel fire. *Tunneling and Underground Space Technology*, 109, 103761. <https://doi.org/10.1016/j.tust.2020.103761>
- J8. **Hua, N.**, Elhami-Khorasani, N. & Tessari, A. (2021). Review of tunnel fire damage assessment methods and techniques. *Transportation Research Record*, <https://doi.org/10.1177/0361198120987228>
- J9. **Hua, N.**, Tessari, A., & Elhami-Khorasani, N. (2020). Quantifying uncertainties in the temperature-time evolution of railway tunnel fires. *Fire Technology*, 57(1), pp. 361-392. <https://doi.org/10.1007/s10694-020-01007-8>
- J10. Gu, X., Liang, X., Shan, Y., Huang, X., & Tessari, A. (2020). Discrete element modeling of shear wave propagation using bender elements in confined granular materials of different grain sizes. *Computers and Geotechnics*, 125, 103672. <https://doi.org/10.1016/j.compgeo.2020.103672>
- J11. Tessari, A., Muszynski, M., & **Colletti, J.** (2018). Surface smoothness evaluation of etched and unaltered sand specimens with mechanical behavior assessment, *Geotechnical Testing Journal*, 42(2), 485-499.

- J12. Johnson, J. B., Vahedifard, F., **Kokkali, P.**, Tessari, A. F., Abdoun, T., & Varuso, R. J. (2017). Numerical simulation of T-walls supported by batter piles within a levee embankment, *DFI Journal-The Journal of the Deep Foundations Institute*, 1-11.
- J13. **Kokkali, P.**, Tessari, A., Abdoun, T., Varuso, R., Johnson, J., Filz, G., & Reeb, A. (2017). Settlement-induced bending moments on pile-founded floodwalls, *International Journal of Physical Modelling in Geotechnics*, 1-19.
- J14. El Ganainy, H., Tessari, A., Abdoun, T. & Sasanakul, I. (2014). Tactile pressure sensors in centrifuge testing, *ASTM Geotechnical Testing Journal*, 37(1), pp. 151-163.
- J15. El Sekelly, W., Tessari, A., & Abdoun, T. (2014). Shear wave velocity measurement in the centrifuge using bender elements, *ASTM Geotechnical Testing Journal*, 37(4), pp. 689-704.
- J16. **Colletti, J.** & Tessari, A. (In Review). Full and field-scale implementation of bender elements to measure primary and secondary wave velocities. Submitted to the International Journal of Physical Modelling in Geotechnics.
- J17. Tessari, A., & Muszynski, M. (In Review). Evaluating sand particle surface smoothness to improve the characterization of macroscale parameters. Submitted to ASCE Journal of Materials in Civil Engineering.
- J18. Shahraki, M., Tessari, A., Bolisetti, C., Kim, K., & Kurt, E. (In Preparation) Large-scale Experimental Investigation of Shallow Foundation Soil-Structure Interaction: Interface Sliding Characterization.
- J19. Coleman, J., Colletti, J., Hoffman, W., & Tessari, A. (In Preparation). Large geotechnical laminar box, instrumentation and data collection for seismic events.
- J20. Coleman, J. & Tessari, A. (In Preparation). Verification and validation of one-dimensional seismic wave propagation code.
- J21. Colletti, J., & Tessari, A. (In Preparation). Quantification of boundary effects in a large geotechnical laminar box.
- J22. Stefanaki, A., Sivaselvan, S., Colletti, J., Panthangi, V., Tessari, A., & Whittaker, A. (In Preparation). Dynamic hybrid simulation technique for soil-foundation-superstructure interaction investigations in a full-scale geotechnical laminar box.

J23. Tessari, A., Panthangi, V., & Colletti, J. (In Preparation). Full-scale soil-foundation-superstructure interaction investigation of a pile group foundation in liquefiable sand.

▪ **Refereed Conference Proceedings**

C1. Shahraki, M., Tessari, A., Bolisetti, C., Kim, K., & Kurt, E. (2022). A large-scale experimental study on the behavior of soil-structure interfaces for dam safety evaluation. In *Proceedings of 2022 Geo-Congress*, Charlotte, North Carolina.

C2. Shahraki, M., Tessari, A., Bolisetti, C., Kim, K., & Kurt, E. (2022). An experimental study of soil-structure interaction: waterproofing membrane in contact with dry and saturated sands. In *Proceedings of 2022 Geo-Congress*, Charlotte, North Carolina.

C3. Hua, N., Tessari, A., & Elhami-Khorasani, N. (2021). Tunnel fire damage assessment: a review. In *Proceedings of 2021 Transportation Research Board Annual Meeting*, Washington DC.

C4. Hua, N., Tessari, A., & Elhami-Khorasani, N. (2020). Damage assessment framework for tunnel structures subjected to fire. In *Proceedings of SiF 2020 11th International Conference on Structures in Fire*, Brisbane, Australia.

C5. Bowman, A., Tessari, A., & Price, C. (2020). Retrofit, redesign, and restructuring of a large geotechnical centrifuge research center. In *Proceedings of the 4th European Conference on Physical Modelling in Geotechnics*, Lulea, Sweden, postponed indefinitely due to coronavirus.

C6. Hua, N., Tessari, A., & Elhami-Khorasani, N. (2020). Concrete lining damage and structural stability assessment during tunnel fires: case studies. In *Proceedings of 2020 Transportation Research Board Annual Meeting*, Washington DC.

C7. Hua, N., Tessari, A., & Elhami-Khorasani, N. (2019). Design fire scenarios for railway tunnel fires. In *Proceedings of the 2019 IABSE Congress*, New York City, pp. 82-86.

C8. Tessari, A. & Black, J. (2018). Development of a teaching centrifuge learning environment using mechanically stabilized earth walls. In *Proceedings of the 9th International Conference on Physical Modelling in Geotechnics*, London, United Kingdom, pp. 545-550.

C9. Colletti, J., Tessari, A., Sett, K., Hoffman, W., and Coleman, J. (2018). Shear wave velocity measurement in a large geotechnical laminar box using bender elements. In

Proceedings of the 9th International Conference on Physical Modelling in Geotechnics, London, United Kingdom, pp. 299-304.

- C10. **Kokkali, P.**, Abdoun, T., & Tessari, A. (2018). Image capture and motion tracking applications in geotechnical centrifuge modelling. In *Proceedings of the 9th International Conference on Physical Modelling in Geotechnics*, London, United Kingdom, pp. 847-852.
- C11. **Colletti, J.**, Panthangi, S., Stefanaki, A., Tessari, A., Sivaselvan, M., & Whittaker, A. (2017). Large-scale Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box, In *24th Structural Mechanics in Reactor Technologies*, Busan, Republic of Korea.
- C12. **Coleman, J.**, Tessari, A., **Colletti, J.**, Hoffman, W., & Whittaker, A. (2017). Large Scale Geotechnical Laminar Box Experimental Tests and Seismic Site Response Benchmarking, In *24th Structural Mechanics in Reactor Technologies*, Busan, Republic of Korea.
- C13. **Kokkali P.**, Abdoun T., & Tessari A. (2017). Experimental Investigation of Settlement Induced Bending Moments on Pile Supported T-Walls. In *Soil Dynamics and Soil-Structure Interaction for Resilient Infrastructure*, Sharm Elsheikh, Egypt.
- C14. El-Sekelly, W., Abdoun, T., Mercado, V., Zeghal, M., & Tessari, A. (2016). Bender Elements and System Identification for Estimation of Shear Wave Velocity in Centrifuge Models and Field Deposits, In *Geotechnical & Structural Engineering Congress*, Pheonix, Arizona.
- C15. Stefanaki, A., Sivaselvan, S., Tessari, A., & Whittaker, A., (2015). Soil-Foundation-Structure Interaction Investigations Using Hybrid Simulation, In *23rd Structural Mechanics in Reactor Technologies*, Manchester, United Kingdom.
- C16. Reeb, A., Filz, G., Johnson, J., Varuso, R., Kokkali, P., Tessari, A., & Abdoun, T. (2015). Validation of a Numerical Model to Analyze Pile-Supported T-Walls, In *International Foundations Congress and Equipment Expo*, San Antonio, Texas.
- C17. Abdoun, T., Sasanakul, I., Tessari, A., & Lawler, J. (2014). In-flight Earthquake and Dynamic Shaking using RPI 2D Shaker, In *8th International Conference on Physical Modeling in Geotechnics*, Perth, Australia, pp. 259-264.
- C18. Tessari, A., Abdoun, T., Wroe, E., & Sasanakul, I. (2014). Boundary Corrected Calibration of Tactile Pressure Sensors, In *8th International Conference on Physical Modeling in*

Geotechnics, Perth, Australia, pp. 331-336.

- C19. Abdoun, T., El-Shamy, U., Tessari, A., Bennett, V., & Lawler, J. (2013). Multi-Institutional Physical Modeling Learning Environment for Geotechnical Engineering Education, In *2013 ASEE Annual Conference*, Atlanta, Georgia.
- C20. Tessari, A., Sasanakul, I., & Abdoun, T. (2013). Characterization of Soil-Foundation Interaction for a T-Wall Flood Protection System in New Orleans, In *Geo-Congress 2013*, San Diego, California, pp. 1100-1103.
- C21. Tessari, A., Sasanakul, I., & Abdoun, T. (2010). Advanced Sensing in Geotechnical Centrifuge Models, In *7th International Conference on Physical Modeling in Geotechnics*, Zurich, Switzerland, pp. 395-400.
- C22. De, A., Zimmie, T.F., Abdoun, T. & Tessari, A. (2010). Physical Modeling of Explosive Effects on Tunnels, In *Fourth International Symposium on Tunnel Safety and Security*, Frankfurt am Main, Germany, pp. 159-167.

STUDENT MENTORING

- Doctoral Advisees
 - Dr. Panagiota Kokkali, graduated spring 2016, RPI, co-advised with Dr. Tarek Abdoun, employed WSP, New York City
 - Dr. Justin Coleman, P.E., graduated spring 2019, UB, co-advised with Dr. Andrew Whittaker, employed INL
 - Dr. Joseph Colletti, graduated spring 2019, UB, employed Barron & Associates
 - Dr. Nan Hua, graduated summer 2021, UB, co-advised with Dr. Negar Elhami-Khorasani, employed Mott MacDonald
 - Marzieh Shahraki, in progress with expected spring 2022 conferral, UB

- Master's Advisees
 - Sarath Panthangi, graduated spring 2016, UB, employed ECS
 - Dr. Joseph Colletti, graduated spring 2016, UB, employed as above
 - Jan Carlos Diaz Fanas, graduated fall 2016, UB, employed GZA GeoEnvironmental
 - Daniel Barron, P.E., graduated spring 2017, UB, employed Barron & Associates
 - Sonia Pang, graduated spring 2018, UB, employed Arup, San Francisco
 - Cody Coonradt, graduated fall 2018, UB, employed Dan Brown and Associates

- Bachelor's Advisees
 - Yeng Hao Yap, graduated spring 2018, UB
 - Evan Supple, graduated spring 2019, UB
 - John Allen, graduated spring 2019, UB
 - Ceira Dawson, graduation spring 2020, UB
 - Ryan Abruzzo, graduation fall 2020, UB

FUNDED RESEARCH

- *Monotonic and dynamic soil-foundation sliding* experiments as **PI** (August 2019 – March 2022). Funding agency: United States Department of Energy. Project funding total of **\$171,886** with 100% share and full support of a doctoral student. This research project is an investigation into the sliding phenomena that occurs at the interface between the soil and foundation during dynamic events. Full-scale testing will be performed to quantify the response at said interface using monotonic and dynamic input motions. The experimental testing is comprised of two thrusts, with the first isolating horizontal motion by applying load via actuator on the concrete foundation element, and the second applying input motion at the base of the sand layer using a shake table.
- *Structural Fire Resistance of Tunnels Considering Soil-Liner Interaction* as **Co-PI** (October 2018 – December 2021) with N. Khorasani. Funding agency: FHWA UTC Region 2 Consortium with UB cost share. Non-cost share project funding budget of **\$208,175** with 50% share and full support of a doctoral student. This project examines the effects of fire on the structural resistance of railway tunnels considering interaction with the soil and liner. Over 500 CFD simulations of fire events have been generated and results have been submitted to two conferences on design fire events and the structural performance on tunnel linings during extreme fire events.
- *Stochastic Seismic Wave Propagation in Full-scale Geotechnical Lamina Box* as **PI** (May 2016 – May 2019). Funding agency: United States Department of Energy. Project funding total of **\$347,135** with 100% share and full support of a doctoral student. This study examines the response of a soil column under a wide range of seismic inputs that vary amplitude, frequency, and duration parameters. Motions are sent multiple times to develop stochastic data sets to characterize uncertainties in wave propagation. Results have been used by the United States Department of Energy in the design and retrofit of nuclear facilities.
- *Investigation on the liquefaction of natural sand with fines* as **PI** (May 2018 – December 2019) with X. Gu. Funding agency: International Joint Research Laboratory of Earthquake

Engineering. Project funding total of approximately **\$100,000** with 50% share. This project examines the effect of fines on the shear wave velocity and liquefaction resistance of natural sand, focusing on the development of a simplified approach for evaluating liquefaction potential of transitional soils in practice as well as recommendations on the rating of foundation performance under seismic loading.

- *Seismic Actuation Retrofit of Geotechnical Centrifuge* as **PI** (April 2016 – September 2017). Funding agency: United States Department of Energy. Project funding total of **\$36,532** with 100% share. This project examined the feasibility to install a new seismic shaker on an existing geotechnical centrifuge using servo-hydraulic actuators.
- *Subsidence and Downdrag Bending Moments Developed in New Orleans T-Walls* as **co-PI** (December 2012 - December 2014) with T. Abdoun. Funding agency: United States Army Corps of Engineers. Project funding budget of **\$220,000** with 50% share and full support of a doctoral student. The purpose of this study was to investigate and gain insight into the mechanisms and magnitudes of downdrag bending moments that develop in battered piles supporting T-Wall structures in the New Orleans area. The results have been used to design and implement next generation floodwalls with a significantly longer lifespan.

RESEARCH PRIOR TO JOINING THE UNIVERSITY AT BUFFALO

- *New Orleans T-Wall and Levee Reinforcement Study* (September 2007 – August 2012), for United States Army Corps of Engineers with T. Abdoun (PI), I. Sasanakul, and R. Varuso. Designed, developed, and tested over 11 centrifuge models to evaluate the structural impact of a sheet-pile cutoff in resisting global instability in soft soils as induced by storm surge surcharge. Results and recommendations have been used to develop new standards as published in the Hurricane and Storm Damage Reduction System Design Guidelines (2012).
- *A Multi-Institutional Classroom Learning Environment for Geotechnical Engineering Education* (2011 – 2013), for the National Science Foundation with U. El-Shamy (PI), T. Abdoun, and M. Pando. Designed and developed instrumentation and testing methods for an undergraduate engineering education module. Worked closely with a team of undergraduate researchers to identify and correct potential sources for misinterpretation and logistical errors. The students designed, constructed, and analyzed a centrifuge experiment. Over 90% of the students responded favorably and indicated that the experience encouraged them to think critically and make deeper conclusions about the experiment results than they would have otherwise done with a regular classroom-based exercise.

- *Bender Element System Development* (January 2007 – November 2007), for Rensselaer Geotechnical Centrifuge with T. Abdoun and Y. Choo. Designed specialized hardware and wrote custom software to allow researchers to rapidly collect, verify, and analyze data from piezoelectric transducers. The software and hardware is used extensively in centrifuge testing and has been adopted by the centrifuge facility at the Korea Advanced Institute of Science and Technology (KAIST).
 - *Tactile Sensor System Development* (2007 – 2012), for Rensselaer Geotechnical Centrifuge with T. Abdoun, I. Sasanakul, and H. El-Ganainy. Established a frequency response function via dynamic testing of the sensors using a MTS machine. This method entails sending random uniform white noise waveforms to the sensors to establish a frequency-based transfer function, which can be applied to correct any event within the defined frequency range. Designed and tested several methods for enabling using in saturated models. Developed and implemented a reliable static in-situ calibration method for the sensors.
 - *Resonant Column, Torsional Shear, and Bender Element Apparatus Development* (April 2009 – August 2010), for Rensselaer Geotechnical Laboratory with T. Abdoun and I. Sasanakul. Designed and developed a bender element system for an existing resonant column and torsional shear chamber.
 - *Vulnerability of Offshore Pipelines to Blast Loading* (November 2007 – January 2009), for confidential entity with T. Abdoun, T. Zimmie, and I. Sasanakul. Designed instrumentation procedure to survive underwater blasting. Performed several centrifuge experiments to evaluate key failure criteria.
 - *Tunnel Hardening and Blast Mitigation Strategies for Under Water Tunnels* (October 2008 – April 2009), for the Department of Homeland Security with T. Abdoun, R. Dobry, and I. Sasanakul. Designed and tested centrifuge models to develop strategic schemes to provide protective measures for under-river tunnels. This study consisted of over 40 advanced centrifuge tests and led to the design and implementation of an external protection system instead of the originally proposed internal retrofit. It resulted in savings of over \$1 billion and shortened the implementation time of the protection system in the field from 36 to 9 months.
- **NEES Research Support**

- *NEESR-SG: Experimental and Micromechanical Computational Study of Pile Foundations Subjected to Liquefaction-Induced Lateral Spreading*, PI: Ricardo Dobry, RPI (2007 – 2011).
- *NEESR-SG: Evaluation of Ground Rupture Effects on Critical Lifelines*, PI: Michael O'Rourke, RPI (2007 – 2009).
- *CAREER - Seismically Induced Delayed-Landslides in Homogeneous Cohesive Slopes and Embankments*, PI: Joseph Wartman, Drexel (2007 – 2008).
- *NEESR-II: Advanced Site Monitoring and Effective Characterization of Site Nonlinear Dynamic Properties and Model Calibration*, PI: Mourad Zeghal, RPI (2008 – 2014).
- *NEESR-SG: Soil Improvement Strategies to Mitigate Impact of Seismic Ground Failures via Novel Integration of Experiment and Simulation*, PI: Scott Olson, UIUC (2008 – 2011).
- *Centrifuge Tests for Static and Seismic Soil-Culvert-Interaction (SCI) of Square Box Culvert Inside a Dry Cohesionless Soil*, PI: Hesham El-Naggar, UWO (2010 – 2011).
- *Seismic Isolation of Earth Retaining Structures Using EPS Geofoam – Centrifuge Testing*, PI: Adda Athanasopoulos-Zekkos, UM Ann Arbor (2010 – 2011).
- *NEESR-CR: Evolutionary Intensity Measures for More Accurate and Informative Liquefaction Hazard Evaluation*, PI: Steve Kramer, UW (2010 – 2014).
- *NEESR-CR: Seismically Induced Rock-Slope Failure: Mechanisms and Prediction*, PI: Joseph Wartman, UW (2010 – 2013).
- *NEESR-CR: Capacity and performance of foundations for offshore wind towers*, PI: Giovanna Biscontin, Texas A&M (2011 – 2014).
- *DARE: Monotonic and cyclical performance of horizontally actuated shallow foundations*, PI: Ioannis Anastasopoulos, NTAU (2012 – 2014).

HOSTED WORKSHOPS AND FORUMS

Organized the *2019 University of Tongji and University at Buffalo Geotechnical Graduate Student Forum*, Buffalo, NY, August 12-15, 2019.

INVITED AND PROFESSIONAL PRESENTATIONS

- “Enhancing the Resilience of Tunnels Subject to Fire Events”, American Association of State Highway and Transportation Officials T-20 Annual Meeting, Co-Presenter: Negar Elhami-Khorasani, Virtual, July 2021.
- “Enhancing the Resilience of Tunnels Subject to Fire Events”, Center for Advanced Infrastructure and Transportation Seminar Series, Co-Presenter: Negar Elhami-Khorasani, Virtual, February 2021.
- “Reducing Uncertainty: A Physical Modelling and Simulation Framework to Advance Multi-Hazard Analysis”, United States Army Corps of Engineers (USACE) Engineering Research and Development Center (ERDC), Vicksburg, MS, August 2019.
- “Full-Scale Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box,” Politecnico di Torino, Torino, Italy, April 2018.
- “Full-Scale Real-time Dynamic Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box,” Tongji University, Shanghai, China, December 2017.
- “A Testing Framework for Seismic Soil-Ballast-Rail-Train Interaction,” International Forum on High-speed Rail, Changsha, China, December 2017.
- “Real-time Dynamics Hybrid Simulation of Soil-Foundation-Structure-Interaction,” Queen’s University, Kingston, Ontario, Canada, November 2017.
- “Full-Scale Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box,” University of Padova, Padua, Italy, October 2017.
- “Full-Scale Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box,” University of Pavia, Pavia, Italy, October 2017.
- “Nonlinear soil-structure interaction analysis,” SMiRT 24, Busan, Republic of Korea, August 2017.
- “Full-Scale Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box,” Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea, August 2017.
- “Full-Scale Hybrid Simulation of Soil-Foundation-Structure-Interaction in a Geotechnical Laminar Box,” Kongju National University, Cheonan, Republic of Korea, August 2017.
- “Centrifuge modeling of the effects of natural hazards on transportation infrastructure,” 2015 Transportation Research Board, Washington, D.C., January 2015.
- “Designing and implementing instrumentation for centrifuge testing,” 6th International Centrifuge Workshop, Troy, NY, May 2011.
- “Enhancing centrifuge modeling using advanced sensing technology,” Rensselaer Polytechnic Institute’s 175th Anniversary of Civil Engineering, Troy, NY, October 2010.
- “Overview of the geotechnical centrifuge research center at Rensselaer,” 5th International Centrifuge Workshop, Davis, CA, September 2009.

- “Model preparation methods and planning for instrumentation,” 4th International Centrifuge Workshop, Troy, NY, September 2008.
- “RPI centrifuge facility and mini-centrifuge demonstration,” GEESD IV NEES Field Demonstration Day, Davis, CA, May 2008.

COURSES

Average weighted course rating of 4.54 out of 5 and average instructor rating of 4.81 out of 5 at the University at Buffalo. Quantitative and qualitative course evaluations are available upon request.

- CIE 534 Geotechnical Earthquake Engineering and Foundation Dynamics
This course is taught yearly in the Fall semester to all levels of graduate students. It has been redesigned to include probabilistic assessment, new liquefaction assessment methods, and cutting-edge non-linear soil-structure interaction analyses based on research underway at the UB SEESL facility.
 - **Fall 2015, N = 9 responses, Overall 4.44, Instructor 4.68**
 - **Fall 2016, N = 7 responses, Overall 4.57, Instructor 4.86**
 - **Fall 2017, N = 5 responses, Overall 4.8, Instructor 4.8**
- CIE 435 Foundation Engineering
This course is taught yearly in the Spring and Summer semesters to junior and senior level students. It is a required course that is typically in the lower rated courses among our peer institutions. I redesigned the course delivery method to focus on real-world examples in the western New York area, engaging students beyond the typical textbook examples.
 - **Summer 2015, N = 9 responses, Overall 4.78, Instructor 4.89**
 - **Summer 2016, N = 16 responses, Overall 4.63, Instructor 4.63**
 - **Summer 2017, N = 24 responses, Overall 4.8, Instructor 5**
 - **Summer 2018, N = 29 responses, Overall 4.7, Instructor 4.9**
 - **Spring 2021, N = 71 responses, Overall 4.6, Instructor 4.9**
- CIE 334 Soil Mechanics
This course is taught yearly in the Fall semester to junior and senior level students. It is a required course and is typically in the lowest rated courses among our peer institutions. It has been redesigned to include novel hybrid course materials and presentation methods that actively engage students in both the classroom and in the laboratory.
 - **Spring 2016, N = 93 responses, Overall 4.46, Instructor 4.7**

- **Spring 2017, N = 119 responses, Overall 4.5, Instructor 4.7**
- **Spring 2018, N = 118 responses, Overall 4.5, Instructor 4.8**
- **Fall 2018, N = 139 responses, Overall 4.4, Instructor 4.8**
- **Fall 2019, N = 100 responses, Overall 4.5, Instructor 4.8**
- **Fall 2020, N = 139 responses, Overall 4.7, Instructor 4.9**
- **Fall 2021, N = 153 responses, Overall 4.5, Instructor 4.9**

SERVICE ACTIVITIES

- Associate editor of the International Journal of Physical Modelling in Geotechnics (2016 - Present).
- UB CSEE Graduate Studies Committee (2021 - Present).
- UB CSEE Undergraduate Studies Committee (2014 - 2021).
- UB CSEE Undergraduate Curriculum Committee (2014 - 2015).
- Mentor for UB CSEE freshmen students (2014-2019).
- Reviewer for ASTM Geotechnical Testing Journal, Meccanica, Canadian Geotechnical Journal, ASCE Journal of Geotechnical and Geoenvironmental Engineering, and over 20 domestic and international conferences.
- Member ASTM D18 with voting memberships in:
 - D18.01 Surface and Subsurface Characterization
 - D18.02 Sampling and Related Field Testing for Soil Evaluations
 - D18.09 Cyclic and Dynamic Properties of Soils
 - D18.11 Deep Foundations
 - D18.23 Field Instrumentation

HONORS AND AWARDS

- Recipient of 2017 SEAS Early Career Teaching Award
- Recipient of the 2013 Thomas Archibald Bedford Prize
- Co-advised a team of graduate and undergraduate students to 1st Place in the 2011 ASCE G-I Geo-Challenge Competition, March 2011
- Recipient of UR Marx Prize, an award for outstanding research on the New Orleans Levee Project, May 2006
- Inducted into Chi Epsilon, the civil engineering honors society, in May 2006

PROFESSIONAL AFFILIATIONS

- American Society of Civil Engineers and Geo-Institute (ASCE GI)

- Earthquake Engineering Research Institute (EERI)
- American Society for Testing and Materials (ASTM)
- United States Universities Council on Geotechnical Education and Research (USUCGER)