

---

## Leonardo Dueñas-Osorio

6100 Main Street, MS-318 • Houston, TX 77005-1827 • United States  
Office (713) 348-5292 • Fax (713) 348-5268 • Home (404) 918-1683  
E-mail: [leonardo.duenas-osorio@rice.edu](mailto:leonardo.duenas-osorio@rice.edu)  
URL: <http://duenas-osorio.rice.edu>

---

### **Academic Preparation**

**Ph.D., Civil and Environmental Engineering, Minor: Probability and Statistics, 12/05**  
Georgia Institute of Technology, Atlanta, Georgia, USA.

**M.Eng., Civil and Environmental Engineering, High Performance Structures, 6/01**  
Massachusetts Institute of Technology, Cambridge, Massachusetts, USA.

**Professional Master, Civil and Environmental Engineering, Project Management, 7/00**  
Pontificia Universidad Javeriana, Bogotá, Colombia.

**Master of Science, Civil and Environmental Engineering, Structural/Earthquake Engineering, 9/98.** Universidad de Los Andes, Bogotá, Colombia.

**Bachelor of Science, Civil and Environmental Engineering, 12/96**  
Universidad de La Salle, Bogotá, Colombia.

### **Outline of Research Interests**

- Analytical and numerical performance characterization of complex lifeline networks under natural hazards, including seismic and hurricane events.
- Probabilistic seismic risk assessment of interdependent infrastructure systems for informed decision making.
- Resilience evaluation of geographically distributed service networks under normal and abnormal operation conditions.
- Applications of graph and reliability theories to structural mechanics, network topology, and flow analyses of smart infrastructure systems.
- Long-term unavailability evaluation of wind turbines for enhancement of safety, operations and maintenance criteria.
- Quantification of soil-foundation-structure interaction effects on the functionality probability of bridges and associated networks in seismic regions.
- Hurricane risk assessment and examination of evacuation behavior in coastal cities.

### **Professional Experience**

07/06 – Present      **Assistant Professor**      Rice University, Department of Civil and Environmental Engineering, Houston, Texas.

Performs research on computational and theoretical modeling of complex systems under multiple hazards, reliability analysis of interdependent infrastructures, probabilistic extreme-event risk estimation, reliability analysis of wind turbines, resilience of smart structural and networked systems, probabilistic soil-foundation-structure interaction, and hurricane risk quantification.

1/06 – 6/06	<b>Post-Doctoral Fellow</b>	Georgia Institute of Technology, School of Civil and Environmental Engineering, Atlanta, Georgia.  Developed time-dependent models of infrastructure systems to capture the likelihood of cascading failures, analyzed highway bridges accounting for soil liquefaction, and developed notes for selected topics of a graduate course on structural control.
8/01 – 12/05	<b>Graduate Research Assistant</b>	Georgia Institute of Technology, Mid-America Earthquake (MAE) Center, Atlanta, Georgia.  Performed interdependent analysis of critical infrastructures with explicit treatment of uncertainty. Also, developed models for regional assessment of building performance, and calibrated decision-making and loss estimation tools.
5/03 – 9/03	<b>Research Engineer (Internship)</b>	Post, Buckley, Schuh and Jernigan (PBS&J), Atlanta, Georgia.  Developed probabilistic models for assessment of dispersion distances, dose decay, and concentrations of seismic-induced release of hazardous materials.
8/00 – 6/01	<b>M.Eng Project Assistant</b>	Massachusetts Institute of Technology, Cambridge, Massachusetts.  Performed site investigation, analysis, and design of retrofit strategies for a historical building in Istanbul, Turkey. The project included base isolation analysis and design, along with local construction budget estimates.
1/97 – 7/00	<b>Structural Engineer</b>	Società Tecnica Internazionale (Sotecni), Bogotá, Colombia.  Conducted seismic design of buildings for railway stations, and 150 km of geometric design for narrow gauge railroads.
8/98 – 7/00	<b>Structural Engineer</b>	Respil Limitada, Bogotá, Colombia.  Executed structural design of 45,000 m <sup>2</sup> for residential and commercial buildings implementing the 1998 update of the Colombian seismic design code.

## **Publications**

### ***Papers Published***

- Christian, J., L. Dueñas-Osorio, A. Teague, Z. Fang, and P. Bedient, (2012). "Uncertainty in floodplain delineation: expression of flood hazard and risk in a Gulf Coast watershed." *Hydrological Processes*, DOI: 10.1002/hyp.9360.
- Dueñas-Osorio, L., and A. Kwasinski, (2012). "Quantification of lifeline system interdependencies after the 27 February 2010  $M_w$  8.8 offshore Maule, Chile earthquake." *Earthquake Spectra*, 28(S1): S581-S603.
- Dueñas-Osorio, L., B. Buzcu-Guven, R. Stein, and D. Subramanian, (2012). "Engineering-based hurricane risk estimates and comparison to perceived risks in storm-prone areas." *ASCE Natural Hazards Review*, 13(1): 1-12.
- Mensah, A., and L. Dueñas-Osorio, (2012). "A closed-form technique for the reliability and risk assessment of wind turbine systems." *Energies*, 5: 1734-1750.

- Ouyang, M., and L. Dueñas-Osorio, (2012). "Time-dependent resilience assessment and improvement of urban infrastructure systems." *Chaos*, 22(3), 033122, 11p.
- Ouyang, M., L. Dueñas-Osorio, and X. Min, (2012). "A three-stage resilience analysis framework for urban infrastructure systems." *Structural Safety*, 36-37: 23-31.
- Rokneddin, K., J. Ghosh, L. Dueñas-Osorio, and J. E. Padgett, (2012). "Bridge retrofit prioritisation for ageing transportation networks subject to seismic hazards." *Structure and Infrastructure Engineering*, DOI: 10.1080/15732479.2011.654230.
- Seo, J., L. Dueñas-Osorio, J. I. Craig, and B. J. Goodno, (2012). "Metamodel-based regional vulnerability estimates of irregular steel moment-frame structures subjected to earthquake events." *Engineering Structures*, 45: 585-597.
- Wang, Z., L. Dueñas-Osorio, and J. E. Padgett, (2012). "Seismic response of a bridge-soil-foundation system under the combined effect of vertical and horizontal ground motions." *Earthquake Engineering and Structural Dynamics*, DOI: 10.1002/eqe.2226.
- Aygun, B., L. Dueñas-Osorio, J. Padgett, and R. DesRoches, (2011). "Efficient longitudinal seismic fragility assessment of a multi-span continuous steel bridge on liquefiable soils." *ASCE Journal of Bridge Engineering*, 16(1): 93-107.
- Dueñas-Osorio, L. and J. Padgett, (2011). "Seismic reliability assessment of bridges with user-defined system failure events." *ASCE Journal of Engineering Mechanics*, 137(10): 680-690.
- Dueñas-Osorio, L. and J. Rojo, (2011). "Reliability assessment of lifeline systems with radial topology." *Computer-Aided Civil and Infrastructure Engineering*, 26(2): 111-128.
- Gómez, C., J. Buriticá, M. Sánchez-Silva, and L. Dueñas-Osorio, (2011). "Optimization-based decision-making for complex networks in disastrous events." *International Journal of Risk Assessment and Management*, 15(5/6): 417-436.
- Gómez, C., M. Sánchez-Silva, L. Dueñas-Osorio, and D. Rosowsky, (2011). "Hierarchical infrastructure network representation methods for risk-based decision-making." *Structure and Infrastructure Engineering*, DOI: 10.1080/15732479.2010.546415.
- Hernández, I. and L. Dueñas-Osorio, (2011). "Sequential propagation of seismic fragility across interdependent lifeline systems." *Earthquake Spectra*, 27(1): 23-43.
- Ouyang, M., and L. Dueñas-Osorio, (2011). "An approach to design interface topologies across interdependent urban infrastructure systems." *Reliability Engineering and System Safety*, 96(11): 1462-1473.
- Ouyang, M., and L. Dueñas-Osorio, (2011). "Efficient approach to compute generalized interdependent effects between infrastructure systems." *ASCE Journal of Computing in Civil Engineering*, 25(5): 394-406.
- Padgett, J., J. Ghosh, and L. Dueñas-Osorio, (2011). "Effects of liquefiable soil and bridge modeling parameters on the seismic reliability of critical structural components." *Structure and Infrastructure Engineering*, DOI: 10.1080/15732479.2010.524654.
- Winkler, J., L. Dueñas-Osorio, R. Stein, and D. Subramanian, (2011). "Interface network models for complex urban infrastructure systems." *ASCE Journal of Infrastructure Systems*, 17(4): 138-150.
- Stein, R., L. Dueñas-Osorio, and D. Subramanian, (2010). "Who evacuates when hurricanes approach? The role of risk, information, and location." *Social Science Quarterly*, 91(3): 816-834.

- Winkler, J., L. Dueñas-Osorio, R. Stein, and D. Subramanian, (2010). "Performance assessment of topologically diverse power systems subjected to hurricane events." *Reliability Engineering and System Safety*, 95(4): 323-336.
- Dueñas-Osorio, L., and S. M. Vemuru, (2009). "Cascading failures in complex infrastructure systems." *Structural Safety*, 31(2): 157-167.
- Dueñas-Osorio, L., and B. Basu, (2008). "Unavailability of wind turbines due to wind-induced accelerations." *Engineering Structures*, 30(4): 885-893.
- Dueñas-Osorio, L., J. I. Craig, and B. J. Goodno, (2007). "Seismic response of critical interdependent networks." *Earthquake Engineering and Structural Dynamics*, 36(2): 285-306.
- Dueñas-Osorio, L., J. I. Craig, B. J. Goodno, and A. Bostrom, (2007). "Interdependent response of networked systems." *ASCE Journal of Infrastructure Systems*, 13(3): 185-194.
- Dueñas-Osorio, L., J. Park, P. Towashiraporn, J. I. Craig, B. J. Goodno, A. Bostrom, and D. Frost, (2004). "Fragility reduction using passive response modification in a Consequence Based Engineering (CBE) framework." *International Journal of Structural Engineering and Mechanics (JSEM)*, 17(3-4), 11p.
- Dueñas-Osorio, L., (2001). In Spanish: "Aislamiento de cimentaciones para mejorar la respuesta sísmica de estructuras." *Revista de la Universidad de La Salle*, 22(32): 51-61. Bogotá, Colombia: Unisalle.
- Dueñas-Osorio, L., (2001). In Spanish: "Control activo: innovación en el control del movimiento sísmico de las edificaciones." *Revista Noticreto*, 61: 70-74. Bogotá, Colombia: Asociación Colombiana de Productores de Concreto (ASOCRETO).

### **Papers Accepted for Publication**

- Hernández-Fajardo, I. and L. Dueñas-Osorio, (2012). "Probabilistic study of cascading failures in complex interdependent lifeline systems." *Reliability Engineering and System Safety*, accepted for publication.
- Reséndez, L., L. Dueñas-Osorio, and J. E. Padgett, (2012). "The social sustainability index for small infrastructure projects: A proposition." *The International Journal of Environmental, Cultural, Economic, and Social Sustainability*, accepted for publication.
- Stein, R., B. Buzcu-Guven, L. Dueñas-Osorio, and D. Subramanian (2012). "How risk perceptions influence evacuations from hurricanes and compliance with government directives." *Policy Studies Journal*, accepted for publication.
- Wang, Z., J. E. Padgett, and L. Dueñas-Osorio (2012). "Fragility analysis of a bridge-soil-foundation system under the combined effect of vertical and horizontal ground motions." *Earthquake Spectra*, accepted for publication.
- Wu, J. and L. Dueñas-Osorio, (2012). "Calibration and validation of a seismic damage propagation model for interdependent infrastructure systems." *Earthquake Spectra*, accepted for publication.

### **Papers in Review**

- Christian, J., K. Rokneddin, M. Ouyang, L. Dueñas-Osorio, and P. Bedient, (2012). "Water system reliability under hurricane impact considering electrical grid interdependence." *Reliability Engineering and System Safety*, in review.

- Ghosh, J., J. E. Padgett, and L. Dueñas-Osorio, (2012). "Surrogate modeling and failure surface visualization for efficient seismic vulnerability assessment of highway bridges." *Probabilistic Engineering Mechanics*, in review.
- Ghosh, J., K. Rokneddin, J. E. Padgett, and L. Dueñas-Osorio, (2012). "Seismic reliability assessment of aging highway bridge networks with field instrumentation data and correlated failures. I: Methodology." *Earthquake Spectra*, in review.
- Hernández-Fajardo, I. and L. Dueñas-Osorio, (2012). "Probabilistic performance of interdependent infrastructure networks under network-consistent seismic hazard." *Earthquake Engineering and Structural Dynamics*, in review.
- Mensah, A., and L. Dueñas-Osorio, (2012). "Improved reliability of wind turbine towers with tuned liquid column dampers (TLCD)." *Structural Safety*, in review.
- Ouyang, M., and L. Dueñas-Osorio, (2012). "Multi-dimensional resilience assessment of electric power systems subjected to hurricane hazards." *Structural Safety*, in review.
- Rokneddin, K., J. Ghosh, L. Dueñas-Osorio, and J. E. Padgett, (2012). "Seismic reliability assessment of aging highway bridge networks with field instrumentation data and correlated failures. II: Applications." *Earthquake Spectra*, in review.
- Wang, Z., L. Dueñas-Osorio, and J. E. Padgett, (2012). "Fragility analysis of a typical isolated multi-span continuous steel girder bridge considering soil-structure interaction and liquefaction." *Journal of Earthquake Engineering*, in review.
- Yazdani, A., L. Dueñas-Osorio, and Q. Li, (2012). "A novel scoring mechanism to support the ranking of complex network topological robustness." *Communications in Nonlinear Science and Numerical Simulation*, in review.
- Yazdani, A., L. Dueñas-Osorio, and Q. Li, (2012). "Water distribution system topology-performance interactions." *Journal of Hydraulic Engineering*, in review.
- Yazdani, A., L. Dueñas-Osorio, Q. Li, B. Berryhil, and J. Wu, (2012). "A Multiscale ensemble approach to topological characterization of the U.S. power transmission networks." *Chaos*, in review.

**Conference Papers** (\* denotes presenter)

- Ghosh, J.\*, J. E. Padgett, and L. Dueñas-Osorio, (2012). "Comparative assessment of different surrogate modeling strategies with application to aging bridge seismic fragility analysis." *Proceedings of the 2012 joint conference of the engineering mechanics institute and the 11th ASCE joint specialty conference on probabilistic mechanics and structural reliability (EMI/PMC 2012)*, Notre Dame, Indiana, USA, June 17-20, 2012.
- Ghosh, J.\*, K. Rokneddin, J. E. Padgett, and L. Dueñas-Osorio, (2012). "Accounting for bridge condition and correlation estimates in the seismic reliability analysis of aging transportation networks." *Bridge maintenance, safety, management, resilience and sustainability*. Proceedings of the sixth international conference on bridge maintenance, safety and management (IABMAS 2012), Stresa, Italy, July 9-12, 2012. Eds. Biondini, F., and D. Frangopol. London: CRC Press, Taylor and Francis Group, pp. 1936-1943.
- Gómez, C.\*, D. Castiblanco, M. Sánchez-Silva, and L. Dueñas-Osorio, (2012). "Conceptual and computational insights from a holistic framework for infrastructure management." *Proceedings of the 2012 IEEE international multi-disciplinary conference on cognitive methods in situation*

- awareness and decision support (CogSIMA 2012)*, New Orleans, Louisiana, USA, March 6-8, 2012. Chair, Jakobson, G. E. Piscataway, NJ: IEEE, article 6188387 pp. 222-229.
- Hernandez-Fajardo, I.\*, and L. Dueñas-Osorio, (2012). "Interdependent fragility of complex urban infrastructure systems subjected to probabilistic earthquake hazards." *Proceedings of the 2011 European safety and reliability conference (ESREL 2011)*, Troyes, France, September 18-22, 2011. Eds. Berenguer, C., A. Grall, and C. Guedes Soares. London, UK: CRC Press, Taylor and Francis Group, pp. 2953-2960.
- Hernandez-Fajardo, I., and L. Dueñas-Osorio, (2012). "Intervention strategies for interdependent seismic fragility control on urban lifeline systems." *Proceedings of the 2012 European safety and reliability conference (ESREL 2012)*, Helsinki, Finland, June 25-29, 2012. Presented by C. Gómez\*.
- Mensah, A. and L. Dueñas-Osorio\*, (2012). "An analytical method for wind turbine system reliability and risk assessment." *Reliability engineering and risk management, Vol. 3*. Proceedings of the international symposium on reliability engineering and risk management (ISRERM 2012), Yokohama, Japan, August 5-8, 2012. Eds. Zhao, Y.-G., J. Li, Z.-H. Lu, and T. Saito. Changsha, China: Central South University Press, pp. 325-330.
- Mensah, A.\* and L. Dueñas-Osorio, (2012). "Reliability analysis wind turbines equipped with tuned liquid column dampers (TLCD)." *Proceedings of the 2012 structures congress: Forging connections in the windy city*, Chicago, Illinois, USA, March 29-31, 2012. Eds. Carrato J., and J. G. Burns. Reston, VA: ASCE Press, pp. 1190-1200.
- Mensah, A., L. Dueñas-Osorio\*, I. Prowell, and M. A. Asaherh, (2012). "Probabilistic combination of earthquake and operational loads for wind turbines." *Proceedings of the 15<sup>th</sup> world conference in earthquake engineering (15WCEE)*, Lisbon, Portugal, September 24-28, 2012.
- Ouyang, M\*. and L. Dueñas-Osorio, (2012). "Probabilistic resilience model of electric power systems subjected to hurricane hazards." *Proceedings of the 12<sup>th</sup> international conference on probabilistic methods applied to power systems (PMAPS 2012)*, Istanbul, Turkey, June 10-14, 2012.
- Subramanian, D\*., J. Salazar, L. Dueñas-Osorio, and R. Stein (2012). "Constructing and validating geographically refined HAZUS-MH4 hurricane wind risk models: a machine learning approach." *Proceedings of the ATC and SEI advances in hurricane engineering conference*, Miami, Florida, USA, October 24-26, 2012.
- Wang, Z.\*, L. Dueñas-Osorio, and J. E. Padgett, (2012). "Optimal intensity measures for probabilistic seismic response analysis of bridges on liquefiable and non-liquefiable soils." *Proceedings of the 2012 structures congress: Forging connections in the windy city*, Chicago, Illinois, USA, March 29-31, 2012. Eds. Carrato, J., and J. G. Burns. Reston, VA: ASCE Press, pp. 527-538.
- Wang, Z.\*, J. E. Padgett, and L. Dueñas-Osorio, (2012). "Influence of soil structure interaction on the fragility of an isolated bridge-soil-foundation system." *Proceedings of the 15<sup>th</sup> world conference in earthquake engineering (15WCEE)*, Lisbon, Portugal, September 24-28, 2012.
- Wang, Z.\*, J. E. Padgett, and L. Dueñas-Osorio, (2012). "Probabilistic seismic response of a bridge-soil-foundation system under the combined effect of vertical and horizontal ground motions." *Bridge maintenance, safety, management, resilience and sustainability*. Proceedings of the sixth international conference on bridge maintenance, safety and management (IABMAS 2012), Stresa, Italy, July 9-12, 2012. Eds. Biondini, F., and D. Frangopol. London: CRC Press, Taylor and Francis Group, pp. 706-713.

- Wu, J., L. Dueñas-Osorio\*, and M. Villagrán, (2012). "Spatial quantification of lifeline system interdependencies." *Proceedings of the 15<sup>th</sup> world conference in earthquake engineering (15WCEE)*, Lisbon, Portugal, September 24-28, 2012.
- Yazdani, A., L. Dueñas-Osorio, and Q. Li, (2012). "Analysis of water distribution network topology to support vulnerability assessment." *Proceedings of the 2012 European safety and reliability conference (ESREL 2012)*, Helsinki, Finland, June 25-29, 2012. Presented by C. Gómez\*.
- Yazdani, A., L. Dueñas-Osorio, and Q. Li, (2012). "Network topology analysis to support optimal design and performance evaluation of water distribution systems." *Proceedings of the 14<sup>th</sup> water distribution systems analysis conference*, Adelaide, Australia, September 24-27, 2012.
- Gómez, C.\*, J. Buriticá, M. Sánchez-Silva, and L. Dueñas-Osorio, (2011). "Vulnerability assessment of infrastructure networks by using hierarchical decomposition methods." *Vulnerability, uncertainty, and risk*. Proceedings of the first international conference on vulnerability and risk analysis and management (ICVRAM), Hyattsville, Maryland, USA, April 11-13, 2011. Ed. Ayyub, B. M. Reston, VA: ASCE Press, pp. 214-221.
- Gómez, C.\*, M. Sánchez-Silva, and L. Dueñas-Osorio, (2011). "Resource allocation in infrastructure networks through clustering based optimization." *Proceedings of the second international conference on soft computing technology in civil, structural and environmental engineering (CSC 2011)*, Chania, Crete, Greece, September 6-9, 2011. Eds. Tsompanakis, Y., and B. H. V. Topping. Stirlingshire, UK: Civil-Comp Press, Paper 46, DOI: 10.4203/ccp.97.46.
- Gómez, C.\*, M. Sánchez-Silva, and L. Dueñas-Osorio, (2011). "Clustering methods for risk assessment of infrastructure network systems." *Proceedings of the 11<sup>th</sup> international conference on applications of statistics and probability in civil engineering (ICASP11)*, Zurich, Switzerland, August 1-4, 2011. Eds. Faber, M. H., J. Kohler, and K. Nishijima. London, UK: CRC Press, Taylor and Francis Group, pp. 1389-1397.
- Hernández-Fajardo, I.\*, and L. Dueñas-Osorio, (2011). "Models of interdependence propagation for the fragility assessment of urban networks." *Proceedings of the 11<sup>th</sup> international conference on applications of statistics and probability in civil engineering (ICASP11)*, Zurich, Switzerland, August 1-4, 2011. Eds. Faber, M. H., J. Kohler, and K. Nishijima. London, UK: CRC Press, Taylor and Francis Group, pp. 1887-1895.
- Hernández-Fajardo, I.\*, and L. Dueñas-Osorio, (2011). "Probabilistic study of cascading failures in complex interdependent lifeline systems." *Vulnerability, uncertainty, and risk*. Proceedings of the first international conference on vulnerability and risk analysis and management (ICVRAM 2011), Hyattsville, Maryland, USA, April 11-13, 2011. Ed. Ayyub, B. M. Reston, VA: ASCE Press, pp. 205-213.
- Leelardcharoen, K., L. Dueñas-Osorio\*, J. Craig, and B. Goodno, (2011). "Seismic fragility analysis of telecommunication systems." *Proceedings of the 11<sup>th</sup> international conference on applications of statistics and probability in civil engineering (ICASP11)*, Zurich, Switzerland, August 1-4, 2011. Eds. Faber, M. H., J. Kohler, and K. Nishijima. London, UK: CRC Press, Taylor and Francis Group, pp. 1424-1432.
- Min, X.\*, and L. Dueñas-Osorio, (2011). "Reliability-based seismic design of infrastructure systems considering interdependence." *Engineering for Sustainability and Prosperity*. Proceedings of the 2011 NSF CMMI research and innovation conference, Atlanta, Georgia, USA, January 4-7, 2011. National Science Foundation (NSF), Grant No. 0748231, DVD-ROM.
- Ouyang, M.\*, L. Dueñas-Osorio, and X. Min, (2011). "Optimum interface topologies between urban infrastructure systems." *Proceedings of the 11<sup>th</sup> international conference on applications of statistics and probability in civil engineering (ICASP11)*, Zurich, Switzerland, August 1-4, 2011.

- Eds. M. H. Faber, J. Kohler, and K. Nishijima. London, UK: CRC Press, Taylor and Francis Group, pp. 2011-2019.
- Ouyang, M.\*, and L. Dueñas-Osorio, (2011). "Resilience Modeling and Simulation of Smart Grids." *Proceedings of the 2011 structures congress: Don't gamble on your future*, Las Vegas, Nevada, USA, April 14-16, 2011. Eds. Ames, D., T. L. Droessler, and M. Hoit. Reston, VA: ASCE Press, pp. 1996-2009.
- Padgett, J., L. Dueñas-Osorio, K. Rokneddin\*, and J. Ghosh\*, (2011). "Reliability assessment of aging bridge networks subject to seismic hazard." *Engineering for Sustainability and Prosperity. Proceedings of the 2011 NSF CMMI research and innovation conference*, Atlanta, Georgia, USA, January 4-7, 2011. National Science Foundation (NSF), Grant No. 0928493, DVD-ROM.
- Rojo, J., and L. Dueñas-Osorio\*, (2011). "Recursive reliability assessment of radial lifeline systems with correlated component failures." *Proceedings of the 11<sup>th</sup> international conference on applications of statistics and probability in civil engineering (ICASP11)*, Zurich, Switzerland, August 1-4, 2011. Eds. Faber, M. H., J. Kohler, and K. Nishijima. London, UK: CRC Press, Taylor and Francis Group, pp. 1435-1443.
- Rokneddin, K.\*, J. Ghosh\*, L. Dueñas-Osorio, and J. Padgett (2011). "The Effects of Deteriorating Bridges on Bridges on the Bridge Network Connectivity." *Proceedings of the 2011 structures congress: Don't gamble on your future*, Las Vegas, Nevada, USA, April 14-16, 2011. Eds. Ames, D., T. L. Droessler, and M. Hoit. Reston, VA: ASCE Press, pp. 2993-3007.
- Dueñas-Osorio, L.\* and J. Padgett, (2010). "Augmented system failure events for bridges under earthquake hazards." *Proceedings of the 2010 structures congress: Building a better tomorrow*, Orlando, Florida, USA, May 12-14, 2010. Eds. Senapathi, S., K. Casey, and M. Hoit. Reston, VA: ASCE Press, pp. 213-215.
- Dueñas-Osorio, L.\*, and J. Rojo, (2010). "Probability models for the reliability metrics of practical power distribution networks." *Safety, reliability and risk of structures, infrastructures and engineering systems. Proceedings of the 10<sup>th</sup> international conference on structural safety and reliability (ICOSSAR 2009)*, Osaka, Japan, September 12-17, 2009. Eds. Furuta, H., D. Frangopol, and M. Shinozuka. London: CRC Press, Taylor and Francis Group, pp. 2856-2863.
- Dueñas-Osorio, L.\* and J. Rojo, (2010). "Reliability assessment of lifeline systems with radial and looped topologies." *Reliability engineering and risk management. Proceedings of the international symposium on reliability engineering and risk management (ISRERM 2010)*, Shanghai, China, September 23-26, 2010. Eds. Li, J., Y.-G. Zhao, J. Chen, and Y. Peng. Shanghai: Tongji University Press, pp. 674-684.
- Hernández-Fajardo, I.\*, and L. Dueñas-Osorio, (2010). "Time-sequential evolution of interdependent lifeline systems." *Safety, reliability and risk of structures, infrastructures and engineering systems. Proceedings of the 10<sup>th</sup> international conference on structural safety and reliability (ICOSSAR 2009)*, Osaka, Japan, September 12-17, 2009. Eds. Furuta, H., D. Frangopol, and M. Shinozuka. London: CRC Press, Taylor and Francis Group, pp. 2864-2871.
- Min, X.\*, and L. Dueñas-Osorio, (2010). "Design of interdependent interfaces for lifeline systems using response surface inverse reliability methods." *Proceedings of the 9<sup>th</sup> US national and 10<sup>th</sup> Canadian conference on earthquake engineering: Reaching beyond borders*, Toronto, Canada, July 25-29, 2010. Earthquake engineering research institute (EERI) and the Canadian association for earthquake engineering, Paper No. 1073, DVD-ROM.
- Padgett, J.\*, J. Ghosh, and L. Dueñas-Osorio, (2010). "Sensitivity of Bridge Reliability to Parameter Variation in Systems Susceptible to Spatially Distributed Soil Liquefaction." *Bridge maintenance, safety, management, and life-cycle optimization. Proceedings of the fifth international*



- conference on bridge maintenance, safety and management (IABMAS 2010), Philadelphia, Pennsylvania, USA, July 11-15, 2010. Eds. Frangopol, D., R. Sause, and C. S. Kusko. Boca Raton: CRC Press, pp. 3473-3480.
- Aygun, B.\* , L. Dueñas-Osorio, J. Padgett, and R. DesRoches, (2009). "Seismic vulnerability of bridges susceptible to spatially distributed soil liquefaction hazards." *Proceedings of the 2009 structures congress: Don't mess with structural engineers*, Austin, Texas, USA, April 30–May 2, 2009. Eds. Griffis, L., T. Helwig, M. Waggoner, and M. Hoit. Reston, VA: ASCE Press, pp. 305-314.
- Min, X.\* , and L. Dueñas-Osorio, (2009). "Inverse reliability-based design of interdependent lifeline systems." *Lifeline earthquake engineering in a multi-hazard environment*. Proceedings of the 2009 technical council on lifeline earthquake engineering (TCLEE) conference, Oakland, California, USA, June 28-July 1, 2009. Eds. Tang, A., and S. Werner. Reston, VA: ASCE Press, pp. 628-639.
- Rokneddin, K.\* , M. Sanchez-Silva, and L. Dueñas-Osorio, (2009). "Reduced computational complexity for the reliability assessment of typical infrastructure topologies." *Lifeline earthquake engineering in a multi-hazard environment*. Proceedings of the 2009 technical council on lifeline earthquake engineering (TCLEE) conference, Oakland, California, USA, June 28-July 1, 2009. Eds. Tang, A., and S. Werner. Reston, VA: ASCE Press, pp. 681-692.
- Dueñas-Osorio, L., and I. Hernández-Fajardo\*, (2008). "Flow-based reliability assessment of infrastructure systems." *Proceedings of the 14<sup>th</sup> world conference on earthquake engineering (14WCEE)*, Beijing, China, October 12-18, 2008. Seismological press of China, Paper I.D. 06-0039, DVD-ROM.
- Towashiraporn, P.\* , L. Dueñas-Osorio, J. I. Craig, and B. J. Goodno, (2008). "An application of the response surface model in building seismic fragility estimation." *Proceedings of the 14<sup>th</sup> world conference on earthquake engineering (14WCEE)*, Beijing, China, October 12-18, 2008. Seismological press of China, Paper I.D. S03-008, DVD-ROM.
- Colwell, S.\* , B. Basu, and L. Dueñas-Osorio, (2007). "Increased reliability of wind turbines with vibration control." *Proceedings of the world wind energy conference*, Buenos Aires, Argentina, October 2-4, 2007. Bonn: World Wind Energy Association (WWEA).
- Dueñas-Osorio, L.\* , and B.R. Ellingwood, (2007). "Reliability assessment of power distribution systems under natural hazards." *Proceedings of the 10<sup>th</sup> international conference on applications of statistics and probability in civil engineering (ICASP10)*, Tokyo, Japan, July 31-August 3, 2007. Eds. Kanda, J., T. Takada, and H. Furuta. London: Taylor and Francis Group.
- Dueñas-Osorio, L., and R. DesRoches\*, (2006). "Effect of liquefaction on the performance of multi-span simply supported bridges." *Proceedings of the 1<sup>st</sup> European conference on earthquake engineering and seismology (ECEES)*, Geneva, Switzerland, September 3-8, 2006. European Association of Earthquake Engineering (EAEE) and the European Seismological Commission (ESC), Paper No. 1379, CD-ROM.
- Dueñas-Osorio, L.\* , K. Leelardcharoen, J. I. Craig, and B. J. Goodno, (2006). "Failure of interdependent networks." *100<sup>th</sup> anniversary earthquake conference: Managing risk in earthquake country*. Proceedings of the 8<sup>th</sup> national conference in earthquake engineering (8NCEE), San Francisco, California, USA, April 18–22, 2006. Earthquake engineering research institute (EERI), CD-ROM.
- Seo, J.-W.\* , P. Towashiraporn, L. Dueñas-Osorio, J. I. Craig and B. J. Goodno, (2005). "Rapid seismic fragility assessment of structures using response surface metamodels." *Proceedings of*

*the 3<sup>rd</sup> annual meeting of the Asian-pacific network of centers for earthquake engineering research (ANCER)*. Seogwipo, Jeju, South Korea. November 10-13, 2005.

Dueñas-Osorio, L.\*, J. I. Craig, and B. J. Goodno, (2004). "Probabilistic response of interdependent infrastructure networks." *Proceedings of the 2<sup>nd</sup> annual meeting of the Asian-pacific network of centers for earthquake engineering research (ANCER)*. Honolulu, Hawaii, USA, July 28-30, 2004.

Dueñas-Osorio, L.\*, J. I. Craig, and B. J. Goodno, (2004). "Rapid regional response simulation of 3D prototype structures for fragility characterization." *Proceedings of the 13<sup>th</sup> world conference in earthquake engineering (13WCEE)*, Vancouver, Canada, August 1-6, 2004. International Association for Earthquake Engineering (IAEE), CD-ROM.

Dueñas-Osorio, L.\*, (2003). "Applications of structural reliability in the development of fragility relationships for a class of buildings in a seismically vulnerable region." *Student leadership council online magazine*, Mid-America Earthquake Center, 3(2): 18p.

Dueñas-Osorio, L., P. Towashiraporn, J. I. Craig, and B. Goodno\*, (2003). "Regional fragility calculations for low rise steel frame buildings using metamodeling Techniques." *Proceedings of the GNDT-MAE-SAFERR (GMS) conference in seismic risk in urban areas*. Erice, Italy, May 26-28, 2003.

Park, J., L. Dueñas-Osorio\*, J. I. Craig, B. J. Goodno, and A. Bostrom, (2003). "Probabilistic decision support for regional seismic risk assessment and mitigation." *Proceedings of the 9<sup>th</sup> international conference in applications of statistics and probability in civil engineering (ICASP9)*. San Francisco, California, USA, July 6-9, 2003. Eds. Der Kiureghian, A., S. Madanat, and J. Pestana. Rotterdam: Millpress, pp. 837-842.

Buyukozturk, O., L. Dueñas-Osorio\*, B. Goodno, and T. Dogan, (2002). "The retrofit of a historical building using base isolation to improve its seismic response." *Proceedings of the 5<sup>th</sup> international congress on advances in civil engineering*. Istanbul, Turkey, September 25-27, 2002. Istanbul Technical University, pp. 434-443.

### **Theses and Dissertations**

Dueñas-Osorio, L., (2005). *Interdependent response of networked systems to natural hazards and intentional disruptions*. Dissertation, Georgia Institute of Technology. Atlanta: Georgia Tech Library, UMI 3198529.

Dueñas-Osorio, L., (2001). *Optimization of base isolation systems using low cost bearings and frictional devices*. Thesis, Massachusetts Institute of Technology. Cambridge: MIT Library.

Pérez-Barreto, S., and L. Dueñas-Osorio, (2000). Spanish. *Diseño y conversión a gas natural comprimido (GNC) de la estación de servicio Flota Blanca*. Thesis, Pontificia Universidad Javeriana. Bogotá, Colombia.

Dueñas-Osorio, L., (1998). Spanish. *Evaluación del comportamiento estructural entre alternativas de traviesas monobloque y bibloque para el ferrocarril Colombiano*. Thesis, Universidad de Los Andes. Bogotá, Colombia.

### **Reports**

Dueñas-Osorio, L., Al Kwasinski, and J. Eidinger, (2012). "Chapter 10: Infrastructure interdependencies and resilience." *M<sub>w</sub> 8.8 offshore Maule, Chile earthquake of February 27, 2010 lifeline performance*. Eds. A. Tang and J. Eidinger, Technical Council on Lifeline Earthquake Engineering (TCLEE), Monograph. Reston: ASCE press.

Craig, J. I., J. D. Frost, B. J. Goodno, P. Towashiraporn, G. Chawla, J.-W. Seo, and L. Dueñas-Osorio, (2007). *Rapid assessment of fragilities for collections of buildings and geostuctures*. Mid-America Earthquake Center, University of Illinois at Urbana-Champaign, CD Release 07-17.

Dueñas-Osorio, L., (2006). *Tolerance of interdependent infrastructures to natural hazards and Intentional disruptions*. Report, Mid-America Earthquake Center. Urbana: MAE Center.

### **Book Chapters**

Satuntira, G. and L. Dueñas-Osorio, (2010). "Chapter 1: Synthesis of modeling and simulation methods on critical infrastructure interdependencies research." *Sustainable Infrastructure Systems: Simulation, Imaging, and Intelligent Engineering*. Eds. K. Gopalakrishnan and S. Peeta. New York: Springer-Verlag.

Dueñas-Osorio, L., (2008). "Chapter 9: Perspectives on seismic risk mitigation decisions under uncertainty." *Risk assessment, modeling and decision support*. Eds. A. Bostrom, S. French, and S. Gottlieb. Berlin: Springer.

### **Invited Abstracts, Posters, and other Presentations not Cited Before** (\* denotes presenter)

Dueñas-Osorio, L.\*, M. Ouyang, D. Subramanian, R. Stein, and B. Guven (2012). "Probabilistic response and resilience assessment model for power systems under hurricane hazards." *ATC and SEI advances in hurricane engineering conference*, Miami, Florida, USA, October 24-26, 2012.

Padgett, J. E., L. Dueñas-Osorio, J. Ghosh, and K. Rokneddin\*, (2012). "IT-enabled continuous risk assessment of road networks for customized and actionable multi-hazard interventions." *Engineering transformation through partnerships*. NSF CMMI research and innovation conference, Boston, Massachusetts, USA, July 9-12, 2011.

Wu, J.\*, L. Dueñas-Osorio, and I. Hernández-Fajardo, (2012). "Probabilistic and statistical approaches to quantify interdependent lifeline network response to natural hazards." *Engineering transformation through partnerships*. NSF CMMI research and innovation conference, Boston, Massachusetts, USA, July 9-12, 2011.

Mensah, A.\* and L. Dueñas-Osorio, (2012). "Reliability-based design of a vibration control system for wind turbines." *WindPower 2012, conference and exhibition*, American Wind Energy Association (AWEA), Atlanta, Georgia, USA, June 3-6, 2012.

Yazdani, A.\* L. Dueñas-Osorio, and Q. Li, (2012). "Quantifying uncertainty to support sustainable planning and management of water supply infrastructures." *Uncertainty quantification transition workshop*, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, North Carolina, USA, May 21-23, 2012.

Guven, B.\*, L. Dueñas-Osorio, R. Stein, D. Subramanian, and J. Salazar, (2012). "The new Rice University and City of Houston online storm risk calculator." *Gulf Coast hurricanes: mitigation and response conference*, Severe Storm Prediction, Education, and Evacuation from Disasters (SSPEED), Houston, Texas, USA, April 10-11, 2012.

Guven, B.\*, L. Dueñas-Osorio, R. Stein, D. Subramanian, J. Salazar, and D. Kahle, (2012). "The storm risk calculator for the City of Houston." *National hurricane conference*, Orlando, Florida, USA, March 26-29, 2012.

Guven, B.\*, R. Stein, L. Dueñas-Osorio, D. Subramanian, and D. Kahle, (2012). "The influence of type and severity of perceived risk in predicting evacuations from hurricanes." *National evacuation conference*, New Orleans, Louisiana, USA, February 7-9, 2012.

- Castiblanco, D.\*, C. Gómez, M. Faber, M. Sánchez-Silva, and L. Dueñas-Osorio, (2012). "Organizational issues in decision-making for temporary activities of transportation infrastructure systems." *Sixth international forum of engineering decision making (IFED)*, Lake Louise, Alberta, Canada, January 26-29, 2012.
- Reséndez, L.\*, L. Dueñas-Osorio, and J. E. Padgett (2012). "The social sustainability index for small infrastructure projects: A proposition." *Eight international conference of environmental, cultural, economic, and social sustainability*, Vancouver, British Columbia, Canada, January 10-12, 2012.
- Christian, J.\*, K. Rokneddin, M. Ouyang, and L. Dueñas-Osorio (2011). "Water system reliability under hurricane impact considering electrical grid interdependency." *2011 annual meeting of the society for risk analysis (SRA)*, Charleston, South Carolina, USA, December 4–7, 2011.
- Dueñas-Osorio, L.\*, (2011). "Reliability assessment and design principles for smart interdependent infrastructure systems." *Engineering opening workshop of the 2011-12 program on uncertainty quantification*, Statistical and Applied Mathematical Sciences Institute (SAMSI), Research Triangle Park, North Carolina, USA, September 19-21, 2011.
- Mensah, A.\* and L. Dueñas-Osorio, (2011). "Reliability assessment of wind turbines subjected to normal winds and extreme events." *WindPower 2011, conference and exhibition*, American Wind Energy Association (AWEA), Anaheim, California, USA, May 22-25, 2011.
- Dueñas-Osorio, L., B. Buzcu-Guven\*, R. Stein, and D. Subramanian, (2011). "Mismatch between engineering-based hurricane risk estimates and perceived risks." *2011 national hurricane conference*, Atlanta, Georgia, USA, April 18-22, 2011.
- Kahle, D.\*, L. Dueñas-Osorio, D. Subramanian, and R. Stein (2011). "A comparison of hurricane-induced power outage models: Component versus statistical models." *2011 national hurricane conference*, Atlanta, Georgia, USA, April 18-22, 2011.
- Dueñas-Osorio, L.\*, and J. Padgett, (2011). "Resources-based bridge system reliability assessment." *Structures congress 2011: Don't gamble on your future*, ASCE Structural Engineering Institute (SEI), Las Vegas, Nevada, USA, April 14-16, 2011.
- Hernández-Fajardo, I.\*, and L. Dueñas-Osorio, (2011). "Probabilistic study of cascading failures in complex interdependent lifeline systems." *Engineering for Sustainability and Prosperity*. NSF CMMI research and innovation conference, Atlanta, Georgia, USA, January 4-7, 2011. National Science Foundation (NSF), Grant No. 0728040.
- Buriticá, J.\*, C. Gómez, M. Sánchez-Silva, and L. Dueñas-Osorio, (2010). "Optimal resource allocation for disaster management." *Fifth international forum of engineering decision making (IFED)*, St. Gallen, Switzerland, December 7-11, 2010.
- Rokneddin, K.\*, and L. Dueñas-Osorio (2010). "Topological Bounds for Reliability Assessment of Large Lifeline Systems." *2010 annual meeting of the society for risk analysis (SRA)*, Salt Lake City, Utah, USA, December 5–8, 2010.
- Ouyang, M.\*, and L. Dueñas-Osorio (2010). "Resilience Assessment and Improvement of Urban Infrastructure Systems." *2010 annual meeting of the institute for operations research and management sciences (INFORMS)*, Austin, Texas, USA, November 7–10, 2010.
- Dueñas-Osorio, L.\*, and B. Basu (2010). "Acceleration-induced failure and risk assessment for wind turbines." *Structures congress 2010: Building a better tomorrow*, ASCE Structural Engineering Institute (SEI), Orlando, Florida, USA, May 12–14, 2010.

Stein, R.\*, L. Dueñas-Osorio, and D. Subramanian (2010). "Who evacuates when hurricanes approach? The role of risk and information." *National evacuation conference*, New Orleans, Louisiana, USA, February 3-5, 2010.

Dueñas-Osorio, L.\*, R. Stein, and D. Subramanian (2008). "Avoiding Disaster When Disaster Strikes: Planning for Evacuations." *Severe storm prediction and global climate impact in the Gulf Coast conference*, Severe Storm Prediction, Education, and Evacuation from Disasters (SSPEED), Houston, Texas, USA, October 29-31, 2008.

### Funded Research

**National Science Foundation (NSF)**, Prioritizing and selecting bridge management actions for heightened truck loads and natural hazards in light of funding allocation patterns, 08/15/12-08/14/15, \$400,00 (Co-P.I. 47%; P.I. Jamie Padgett).

**National Science Foundation (NSF)**, CAREER: Reliability assessment and risk mitigation principles for smart interdependent infrastructure systems, 04/01/08-03/30/14, \$413,710 (P.I. 100%).

**National Science Foundation (NSF)**, IT-enabled continuous risk assessment of road networks for customized and actionable multi-hazard interventions, 08/01/09-07/31/12, \$386,683 (Co-P.I. 49%; P.I. Jamie Padgett).

**City of Houston**, Development and Validation of the Online Storm Risk Calculator Tool for Public Usage, 01/01/11-07/31/13, \$388,466 (P.I. 95%; Co-P.I.s Robert Stein and Devika Subramanian).

**Shell Center for Sustainability**, Sustainable Water infrastructure for improving public health protection, 01/01/10-06/30/12, \$43,968 (Co-P.I. 50%; P.I. Qilin Li).

**National Science Foundation (NSF)**, Interdependent response of complex urban infrastructures subjected to multiple hazards, 10/01/07-09/30/11, \$282,715 (P.I. 80%; Co-P.I. Robert Stein).

**Rice Faculty Initiatives Fund**, Informative household-level risk assessment to support the evacuation decisions of Houstonians, 07/01/08-06/30/10, \$59,436 (P.I. 80%; Co-P.I.s Robert Stein, Devika Subramanian, and Phillip Bedient).

**Shell Center for Sustainability**, Integrated Economic, Environmental and Reliability Modeling of Power System Growth, 01/01/08-12/31/08, \$33,000 (Co-P.I. 33%; P.I. Daniel Cohan).

**City of Houston**, Tools for household-level risk assessment and evaluation of evacuation policies under hurricane hazards, 08/01/07-07/31/08, \$36,360 (P.I. 33%; Co-P.I.s Robert Stein and Devika Subramanian).

**Rice International Collaboration Fund**, Strategic Alliance with the Los Andes University in Bogotá, Colombia, 03/01/07-02/29-08, \$18,200 (P.I. 100%).

### Teaching Experience

2007 – Present      **Assistant Professor**      Rice University, Department of Civil and Environmental Engineering, Houston, Texas.

2011- Present: **CEVE 524 - "Time-dependent system reliability modeling"**. This course provides graduate students with the foundations to assess the reliability and risk of complex engineering systems. Modern theoretical and computational methods to link component reliability to system-level reliability are derived and implemented. Offered during the Fall terms in alternating years.

2007- Present: **CEVE 492/592 - “Modeling and analysis of complex infrastructure systems”**. This course teaches students concepts of graph theory, complex systems, and network science applicable to the modeling, analysis, and performance prediction of infrastructure systems. The course is offered to senior undergraduate students and first year graduate students. Offered during the Fall terms in alternating years.

2007-Present: **CEVE/STAT 313 - “Uncertainty and risk for engineers”**. This is an undergraduate course to explicitly address the ASCE 2025 vision for new professionals to become fluent on applied probability and uncertainty evaluation. The course is also cross-listed with the Department of Statistics and explores decision analysis, statistics of extremes, and Bayesian statistics among other topics for quantifying uncertainty in practical decision making. Offered during Spring terms.

2007-2010: **CEVE/COMP 495, POLI 481 - “Hurricane risk assessment and evacuation policies for the City of Houston.”** This was a research-oriented course for undergraduate students, in which multi-disciplinary teams provided students the opportunity to design and implement behavioral surveys of evacuation behavior, develop fragility models for detached houses and utility systems, and write research papers with relevant hypotheses for emergency managers. This course was offered during the Spring and Fall terms.

*Note:* All classes by Dr. Dueñas-Osorio are digitally recorded, including instructor handwriting, slide shows, and support software. This approach allows students to review lectures and specific course passages, while indirectly providing feedback to the instructor about lecture interests and topics of conceptual difficulty from time and frequency usage statistics.

Spring 2006	<b>Instructor</b>	Georgia Institute of Technology, School of Civil and Environmental Engineering, Atlanta, Georgia.
		Taught a College of Engineering undergraduate class in <i>Vector Mechanics</i> , and partially instructed a graduate class in <i>Earthquake Engineering</i> for Prof. Reginald DesRoches.
8/01 – 12/05	<b>Graduate Teaching Assistant</b>	Georgia Institute of Technology, School of Civil and Environmental Engineering, Atlanta, Georgia.
		Provided undergraduate students with technical support to homework problems and lecture questions. Subjects covered included <i>Probability and statistics</i> (spring 2002 and spring 2005, Dr. Bruce Ellingwood), and <i>Statics and Dynamics</i> (spring 2003 and spring 2004, Dr. Barry Goodno).
4/04 – 12/05	<b>Campus Tutor</b>	Georgia Institute of Technology, Division of Student Affairs, Success Programs, Atlanta, Georgia.
		Participated in 1-to-1 mentoring and tutoring of undergraduates on <i>Statics and Dynamics</i> , <i>Probability</i> , <i>Physics</i> , <i>Calculus</i> , <i>French</i> , and <i>Spanish</i> .
1/05	<b>Peer Instructor</b>	Texas A&M University College Station, Texas.
		Developed and coordinated the capstone project in seismic loss estimation for the 2005 MAE Center Consequence-Based Engineering Institute.

## Honors and Awards

**2010 ASCE Outstanding Reviewer**, 01/11

American Society of Civil Engineers (ASCE), Journal of Bridge Engineering, Reston, Virginia.

**Faculty Early Career Development (CAREER) Award for Young Investigators**, 03/08

National Science Foundation (NSF), Arlington, Virginia.

**Best Ph.D. Thesis Award**, 03/06

Georgia Institute of Technology, School of Civil and Environmental Engineering, Atlanta, Georgia.

**Winner of the SAIC 2005 Ph.D. Student Paper Competition**, 4/05

Science Applications International Corporation (SAIC) and the Georgia Institute of Technology, Atlanta, Georgia.

**Excellence of poster presentation in the 2005 Georgia Tech graduate research symposium**, 4/05, Georgia Institute of Technology, Atlanta, Georgia.

**Bill Schultz fellowship for graduate students**, 8/04

Georgia Institute of Technology, Atlanta, Georgia.

**Field mission fellowship to Japan**, 7/04

NSF Centers for Earthquake Engineering Research, Urbana, Illinois.

**Outstanding graduate teaching assistant**, 5/04

Georgia Institute of Technology, Atlanta, Georgia.

**Best poster award in the 3<sup>rd</sup> MAE Center research assistant symposium**, 11/02

Mid-America Earthquake Center, Memphis, Tennessee.

**Doctoral assistantship**, 8/01

Georgia Institute of Technology, Atlanta, Georgia.

**Scholarship for graduate program at MIT**, 6/00

Association for the future of Colombia, COLFUTURO, Bogotá, Colombia.

**Second ranked among graduating senior students in civil engineering**, 12/96

Universidad de la Salle, Bogotá, Colombia.

## Invited Talks

“Complex systems pathways to risk–based decision support in infrastructure engineering.” **ETH Zurich Risk Center**, Zurich, Switzerland, December 18, 2012.

“The role of interdependencies in the probabilistic risk assessment of infrastructure systems.” **Networks of Networks: Systemic Risk and Infrastructural Interdependencies, a Satellite of the Annual Network Science Conference on Complex Networks**, Evanston, Illinois, USA, June 19, 2012.

“Probabilistic resilience assessment of critical infrastructures enabled by complex systems tools.” **The Santa Fe Institute, Power Grids as Complex Networks**, Santa Fe, New Mexico, USA, May 17-19, 2012.

“Lifeline system interdependencies: Field observations and modeling challenges.” **Lifelines Council of the City and County of San Francisco**, San Francisco, California, USA, April 25, 2012.

- “Understanding interdependent infrastructure systems: Modeling challenges and practical applications.” **Northern California Chapter of the Earthquake Engineering Research Institute (EERI)**, San Francisco, California, USA, April 25, 2012.
- “Understanding interdependent infrastructure systems: Modeling insights and practical challenges.” **Earthquake Engineering Research Institute (EERI), Annual Meeting 2012**, Memphis, Tennessee, USA, April 12, 2012.
- “Dealing with critical infrastructure systems: Computation, theory, and challenges.” **Structural Engineering, Mechanics and Materials Seminar, Department of Civil and Environmental Engineering, Georgia Institute of Technology**, Atlanta, Georgia, USA, March 16, 2012.
- “Computationally efficient reliability assessment of smart utility systems with radial topology.” **Department of Computational and Applied Mathematics, Rice University**, Houston, Texas, USA, March 28, 2011.
- “Quantification of lifeline systems coupling strength.” **Workshop on Challenges and opportunities for lifeline systems engineering, Technical Council on Lifeline Earthquake Engineering (TCLEE) and the Earthquake Engineering Research Institute (EERI)**, San Diego, California, USA, February 9, 2011.
- In Spanish: “Confiabilidad de turbinas de viento ante aceleraciones estructurales.” **Facultad de Ingeniería Civil, Universidad Santo Tomas**, Tunja, Colombia, October 19, 2010.
- “Reliability assessment of power distribution systems for real-time decision making.” **Society for the Advancement of Chicanos and Native Americans (SACNAS)**, Anaheim, California, USA, October 1, 2010.
- “Climate change effects on infrastructure systems.” **The Keston Institute for Public Finance and Infrastructure Policy at the University of Southern California**, Los Angeles, California, USA, February 25, 2010.
- “Complex Networks: The Key to Resilient Infrastructure Systems.” **Scientia Institute, Rice University**, Houston, Texas, USA, January 26, 2010.
- “Reliability of power systems and the human condition.” **Society for the Advancement of Chicanos and Native Americans (SACNAS)**, Dallas, Texas, USA, October 16, 2009.
- “The present and future of critical infrastructure systems in Houston, Texas.” **Glasscock School of Continuing Studies, Rice University**, Houston, Texas, USA, March 30, 2009.
- “Interdependencies across critical infrastructure systems: Power and telecommunication.” **Department of Electrical and Computer Engineering, Texas A&M University**, College Station, Texas, USA, March 24, 2009.
- “Utility system interdependencies and transportation networks.” **Pacific Earthquake Engineering Research (PEER) Center, University of California, Berkeley**, Berkeley, California, USA, March 18, 2009.
- “Quantification of perceived and objective risk discrepancies in hurricane prone areas.” **Hazard Reduction and Recovery Center, Texas A&M University**, College Station, Texas, USA, March 6, 2009.
- “Critical infrastructure cascades: Intradependence, interdependence, and socio-technical coupling.” **Disasters Roundtable, The National Academies**, Irvine, California, USA, February 26, 2009.



- “Research directions for the reliability and risk assessment of interdependent infrastructures.”  
**Workshop on the vulnerability of critical infrastructure systems with emphasis on power systems and dams, University of Wisconsin-Madison**, Madison, Wisconsin, USA, January 14, 2009.
- “Time-dependent tolerance of interdependent civil infrastructures to natural hazards and intentional disruptions.” **Department of Geography and Environmental Engineering, Johns Hopkins University**, Baltimore, Maryland, USA, December 3, 2008.
- “Perceived and objective risk discrepancies among shadow evacuees.” **Severe Storm Prediction, Education, and Evacuation from Disasters (SSPEED) Conference**, Houston, Texas, USA, October 29, 2008.
- “Quantification of perceived and objective risk discrepancies in hurricane prone areas.” **Department of Mechanical Engineering and Materials, Rice University**, Houston, Texas, USA, October 29, 2008.
- “Perceived and objective risk discrepancies among shadow evacuees.” **Texas Hurricane Conference**, Galveston, Texas, USA, May 21, 2008.
- “Leonardo da Vinci: contributions to systems engineering.” **Houston Museum of Natural Science**, Houston, Texas, USA, April 15, 2008.
- “Unavailability of wind turbines from wind-induced accelerations.” **The Baker Institute for Public Policy, Rice University**, Texas offshore wind roundtable, Houston, Texas, USA, February 13, 2008.
- In Spanish: “Tolerancia de las redes de infraestructura civil a desastres naturales y ataques malintencionados.” **Corporación Universitaria de la Costa**, Barranquilla, Colombia, November 9, 2007.
- “Performance of critical infrastructure systems subjected to natural hazards and intentional disruptions.” **Computer and Information Technology Institute (CITI), Rice University**, Houston, Texas, USA, November 2, 2007.
- “Risk assessment of complex infrastructures.” **Society for the Advancement of Chicanos and Native Americans (SACNAS)**, Kansas City, Missouri, USA, October 12, 2007.
- “Interdependent response of urban infrastructures to natural and intentional hazards.” **Department of Civil Engineering, Purdue University**, West Lafayette, Indiana, USA, April 10, 2007.
- “Tolerance of interdependent civil infrastructures to natural hazards and intentional disruptions.” **Department of Statistics, Rice University**, Houston, Texas, USA, September 25, 2006.
- “Effects of soil liquefaction on the seismic vulnerability of highway bridges.” **Department of Civil and Environmental Engineering, Universidad de Los Andes**, Bogotá, Colombia, August 11, 2006.
- “Reliability of electric power grids under low-frequency/high-consequence seismic hazards.” **Department of Civil and Environmental Engineering, Universidad de Los Andes**, Bogotá, Colombia, August 10, 2006.
- “Review of seismic risk mitigation decisions under uncertainty, by Robin McGuire.” **NSF-Sponsored workshop on “Strategic directions for seismic risk modeling and decision support”**, Boulder, Colorado, USA, July 14-15, 2006.

“Response of interdependent civil infrastructures to natural hazards and intentional disruptions.”  
**Department of Civil and Environmental Engineering, Colorado State University**, Fort Collins, Colorado, USA, March 30, 2006.

“Interdependent response of critical infrastructures.” **Department of Civil and Environmental Engineering, University of California at Davis**, Davis, California, USA, February 16, 2006.

“Tolerance of interdependent civil infrastructures to natural hazards and intentional disruptions.”  
**Department of Civil and Environmental Engineering, Rice University**, Houston, Texas, USA, February 3, 2006.

“Interdependent response of networked systems to perturbations.” **School of Aerospace Engineering, Georgia Institute of Technology**, Atlanta, Georgia, USA, September 30, 2005.

“The performance of interacting infrastructures.” **California Institute for Energy and Environment**, Sacramento, California, USA, August 9, 2005.

“Tolerance of civil infrastructure networks to natural hazards and deliberate attacks.” **Department of Civil and Environmental Engineering, Universidad de Los Andes**, Bogotá, Colombia, May 11, 2005.

“Simulation of regional interdependent response for fragility characterization and real-time decision making.” **Department of Structural Engineering, University of California, San Diego**, La Jolla, California, USA, May 5, 2003.

“Seismic retrofit strategies for historical buildings.” **Colombian Society of Engineers**, Bogotá, Colombia, August 8, 2001.

“The rehabilitation of Mitchell Hall for seismic upgrade.” **University of Cambridge**, Cambridge, United Kingdom, January 26, 2001.

### **Professional Affiliations and Roles**

**American Society of Civil Engineers (ASCE)** – Structural Engineering Institute (SEI) and Technical Council on Lifeline Earthquake Engineering (TCLEE)

- *Chair of the TCLEE Lifeline Systems Interdependencies Committee*, 12/09 – Present.
- *Member of the ASCE/SEI Technical Council on Life-Cycle Performance, Safety, Reliability, and Risk of Structural Systems*
  - *Task Group 2 on Reliability Based Structural System Performance Indicators*, 05/09 – Present.
  - *Task Group 3 on Risk Assessment of Structural Infrastructure Facilities and Risk-Based Decision Making*, 05/09 – Present.
- *Member of the SEI Seismic Effects Committee*, 6/06 – Present.
- *Member of the SEI Structural Control Committee*, 6/06 – 6/09.
- *ASCE Associate Member*, 8/06 – Present.
- *ASCE Member*, 8/00 – 8/06.

**American Wind Energy Association (AWEA)**

- *Secretary of the AWEA/ASCE wind turbine structures group*, 07/10 – Present.
- *Member*, 7/10 – Present.

**Association for Computing Machinery (ACM)**

*Member*, 1/12 – Present.

**Complex Systems Society (CSS)**

*Member, 1/10 – Present.*

**Earthquake Engineering Research Institute (EERI)**

- *Member, 3/04 – Present.*
- *President (Georgia Institute of Technology, Student Chapter), 8/02 – 2/04.*

**Institute of Electrical and Electronics Engineers (IEEE)**

*Member, 1/07 – Present.*

**Joint Committee in Structure Safety (JCSS)**

*Invited Member, 11/08 – Present.*

**International Association for Bridge Maintenance and Safety (IABMAS)**

*Member, 07/10 – Present.*

**International Association on Structural Safety and Reliability (IASSAR)**

*Member, 6/09 – Present.*

**International Civil Engineering Risk and Reliability Association (CERRA)**

*Member, 6/03 – Present.*

**Society for Industrial and Applied Mathematics (SIAM)**

*Member, 7/11 – Present.*

**Society of Hispanic Professional Engineers (SHPE)**

*Member, 8/11 – Present.*

**Colombian Society of Engineers (SCI)**

*Member, 1/97 – 6/00.*

**Editorial Positions****ASCE Journal of Computing in Civil Engineering**

*Associate Editor, 3/10 – Present.*

**ASCE Natural Hazards Review**

*Associate Editor, 8/10 – Present.*

**Earthquake Spectra**

*Responsible Editor, 7/12 – Present.*

**Revista Ingeniería de Construcción, Chile**

*International Editorial Board, 10/09 – Present.*

**Peer Reviewer*****Journals***

- Applied Energy
- ASCE Journal of Bridge Engineering
- ASCE Journal of Computing in Civil Engineering
- ASCE Journal of Engineering Mechanics

- ASCE Journal of Infrastructure Systems
- ASCE Journal of Structural Engineering
- ASCE Natural Hazards Review
- Chaos, Solitons & Fractals
- Communications of the Association for Computing Machinery
- Computer-Aided Civil and Infrastructure Engineering
- Earthquake Engineering and Structural Dynamics
- Earthquake Spectra
- Earthquakes and Structures
- Engineering Structures
- Environmental Science and Technology
- IEEE Transactions on Power Systems
- IEEE Transactions on Reliability
- IEEE Transactions on Systems, Man, and Cybernetics--Part C: Applications and Reviews
- International Journal of Critical Infrastructure Systems
- International Journal of Electrical Power and Energy Systems
- International Journal of Environmental Technology and Management
- International of Reliability and Safety
- International Journal of Risk Assessment and Management
- Journal of Earthquake Engineering
- Journal of Energy Engineering
- Journal of Loss Prevention in the Process Industries
- Journal of Systems Science and Systems Engineering
- Journal of Zhejiang University SCIENCE C (Computers and Electronics)
- KSCE Journal of Civil Engineering
- Natural Hazards
- Natural Hazards and Earth System Sciences
- Physica A
- Probabilistic Engineering Mechanics
- Public Works Management and Policy
- Reliability Engineering and System Safety
- Revista Ingeniería de Construcción (Chile)
- Risk Analysis
- Structural Safety
- Structure and Infrastructure Engineering
- Water Resources Management
- Wind Energy

### **Conferences**

- European Safety and Reliability Conference (ESREL)
- International Conference on Applications of Probability and Statistics (ICASP)
- International Conference on Bridge Maintenance, Safety and Management
- International Conference on Structural Safety and Reliability (ICOSSAR)
- ASCE/SEI Structures Congress
- World Conference in Earthquake Engineering (WCEE)

**Funding Agencies**

- U.S. National Science Foundation (NSF)
- Natural Sciences and Engineering Research Council of Canada (NSERC)

**Current Research Advising and Mentoring*****Post-Doctoral Fellows***

**Alireza Yazdani**, Post-Doctoral Fellow, Department of Civil and Environmental Engineering, Rice University, August 2011 – Present. Optimization of potable water network topologies for enhanced reliability, energy consumption, water quality, and sustainability.

***Graduate Research Assistants***

**Andres Gonzalez**, Ph.D. student, Department of Civil and Environmental Engineering, Rice University, August 2012 – Present. Theoretical formulation of infrastructure system restoration and interdependencies for decision making.

**Akwasi Mensah**, Ph.D. student, Department of Civil and Environmental Engineering, Rice University, January 2011 – Present. Long-term availability assessment of wind turbines and power system outage prediction models.

**Zhenghua Wang**, Ph.D. Candidate (co-advised with J. Padgett), Department of Civil and Environmental Engineering, Rice University, August 2010 – Present. Probabilistic modeling of bridge systems with soil-structure interaction for uniform risk design.

**Keivan Rokneddin**, Ph.D. Candidate, Department of Civil and Environmental Engineering, Rice University, November 2008 – Present. Development of new topological and statistical learning approaches for correlated bridge network reliability assessment.

**Xing Min**, M.S. Student, Department of Civil and Environmental Engineering, Rice University, August 2008 – Present. Design of interdependent infrastructure interfaces by inverse system reliability methods.

***Other Graduate Students and Visitors***

**Camilo Gomez**, Ph.D. Candidate, Department of Civil and Environmental Engineering, Universidad de Los Andes, January 2011 – Present. Development of a systems engineering approach for infrastructure operation, management and decision making.

**Laura Reséndez**, Ph.D. Candidate, Department of Anthropology, Rice University, February 2010 – Present. Quantification of the social dimension of sustainability in infrastructure projects.

***Undergraduate Research Assistants***

**Chris K. Chan**, Department of Civil and Environmental Engineering, Rice University, August 2012 – Present. Data collection of power distribution system layouts and interfaces with dependent systems across Houston.

**Past Research Advising and Mentoring*****Post-Doctoral Fellows***

**Min Ouyang**, Post-Doctoral Fellow, Department of Civil and Environmental Engineering, Rice University, December 2009 – February 2012. Modeling of smart infrastructure system interdependencies, reliability and resilience.

**Graduate Research Assistants**

**Isaac Hernandez-Fajardo**, Ph.D., Department of Civil and Environmental Engineering, Rice University, August 2007 – May 2012. Thesis title: Probabilistic fragility of interdependent urban systems subjected to seismic hazards.

**Bayram Aygun**, M.S., Department of Civil and Environmental Engineering, Rice University, August 2007 – May 2009. Thesis title: Efficient seismic fragility assessment of highway bridges on liquefiable soils.

**Other Graduate Students and Visitors**

**David Kahle**, Ph.D., Department of Statistics, Rice University, August 2010 – May 2012. Comparison of statistical models of spatially distributed power outages with engineering models.

**Kanoknart Leelardcharoen**, Ph.D., Department of Civil and Environmental Engineering, Georgia Institute of Technology, August 2006 – May 2012. Interdependence modeling of power and telecommunication systems under seismic hazards.

**Undergraduate Research Assistants**

**Jason Wu**, Department of Civil and Environmental Engineering, Rice University, May 2010 – September 2012. Validation of lifeline interdependence failure propagation models using the 2010 Chile earthquake and quantification of coupling strength using spatial interpolation models.

**Josh Rutenberg**, Department of Civil and Environmental Engineering, Rice University, March 2009 – May 2012. Time series analysis of coupled utility system performance.

**Anjie Dong**, Department of Mechanical Engineering and Materials Science, Rice University, May 2011 – August 2011. Modeling of wind turbines using tools from the National Renewable Energy Laboratory (NREL).

**Benjamin Berryhill**, Department of Civil and Environmental Engineering, Rice University, May 2010 – May 2011. Topological characterization of power transmission systems across the United States.

**Carter Wang**, Department of Computational and Applied Mathematics, Rice University, January 2011 – May 2011. Evaluation of percolation theory with heterogeneous percolation probability for network applications.

**Gesara Satumtira**, Department of Civil and Environmental Engineering, Rice University, May 2009 – May 2010. Synthesis of interdependent infrastructure systems research across disciplines.

**James Winkler**, Department of Chemical Engineering, Rice University, January 2009 – December 2009. Evaluation of storm-track models of hurricanes in the Gulf coast.

**Grant Warnecke**, Department of Civil and Environmental Engineering, Rice University, January 2008 – July 2009. Coupled modeling of rainfall and river models for flat watershed flood predictions.

**William McGuinness**, Department of Civil and Environmental Engineering, Rice University, August 2007 – May 2009. Calculation of storm surge for Houston flood analyses.

**Olufemi Oke**, Department of Civil and Environmental Engineering, Rice University, August 2008 – May 2009. Modeling of the Texas power grid for electricity growth.

**Jay Datesh**, Department of Statistics, Rice University, August 2008 – December 2008. Development of synthetic models of infrastructure systems.

**Eileen Ong**, Department of Civil and Environmental Engineering, Rice University, May 2008 – September 2008. Construction of Origin-Destination traffic databases for road network analyses.

**David G. Murad**, Department of Statistics, Rice University, May 2007 – May 2008. Exploration of probability laws for the reliability of power distribution systems.

**Alison Slowey**, Department of Civil and Environmental Engineering, Rice University, May 2007 – May 2008. Study of topological properties of power systems.

### **Current Synergistic and Outreach Activities**

**Chi Epsilon Civil Engineering Honor Society**, Fall 2012 – Present. Faculty advisor for the Rice University chapter overseeing activities to promote scholarship, character, practicality, and sociability among high achieving civil and environmental engineering students.

**Empowering Leadership Alliance (ELA)**, Fall 2010 – Present. Long-term mentor of minority students.

**Society for Hispanic Professional Engineers (SHPE)**, Fall 2011 – Present. Judge for the graduate student paper and poster competitions, and panelist on careers in academia.

**Universidad de Los Andes, Bogotá, Colombia**, July 2007 – Present. Strategic Los Andes-Rice University alliance to encourage joint research proposals, faculty exchange, student recruitment and collaboration.

### **Past Synergistic and Outreach Activities**

**Engineers without Borders (EWB)**, August 2006 – May 2012. Faculty advisor for the Rice University chapter of EWB overseeing four projects in developing countries on bridge design, water purification, solar power, and health center construction.

**National Science Foundation (NSF)**, September 7, 2012. Contributor to a showcase of NSF-funded hazards research in recognition of the national preparedness month. In collaboration with J. E. Padgett. Hart Senate Office Building, Capitol Hill, USA.

**Alliance for Graduate Education and the Professoriate (AGEP)**, Summer 2008 – Summer 2011. Speaker on academic careers for minorities and research on hurricane risk for Houston.

**Society for Advancement of Chicanos and Native Americans in Science (SACNAS)**, Fall 2007 – Fall 2010. Mentor, judge of graduate technical presentations, and speaker on risk and reliability in engineering for the SACNAS national conferences.

**Rice University Summer Institute of Statistics (RUSIS)**, Summer 2007 – Summer 2009. Guest lecturer and faculty advisor to undergraduate students, especially from underrepresented minorities, who want to work on applied statistical problems posed by aging urban systems.

### **Academic and University Service Activities**

#### ***Thesis Committees, Rice University***

Fall 2012: Dharma Theja Reddy Pasala. Ph.D. Thesis Defense, Department of Civil and Environmental Engineering. "Control of structural systems using novel adaptive and adaptive-passive devices." Advisor: Dr. Satish Nagarajaiah.

- Fall 2012: Luis Alejandro Robledo Ricardo. Ph.D. Thesis Defense, Department of Mechanical Engineering. "Nonlinear stochastic analysis of motorcycle dynamics." Advisor: Dr. Pol Spanos.
- Spring 2012: Jason K. Christian. Ph.D. Thesis *Defense*, Department of Civil and Environmental Engineering. "Assessing coastal vulnerability: Advanced modeling methods and dynamic hydraulic characteristics of Gulf Coastal systems." Advisor: Dr. Phillip Bedient.
- Spring 2012: Jason K. Christian. Ph.D. Thesis *Proposal*, Department of Civil and Environmental Engineering. "Assessing coastal vulnerability: Advanced modeling methods and dynamic hydraulic characteristics of Gulf Coastal systems." Advisor: Dr. Phillip Bedient.
- Spring 2012: Jayadipta Ghosh. Ph.D. Thesis Proposal, Department of Civil and Environmental Engineering. "Parametrized reliability assessment and life-cycle analysis of aging highway bridges." Advisor: Dr. Jamie E. Padgett.
- Spring 2012: Isaac Hernández-Fajardo. Ph.D. Thesis Defense, Department of Civil and Environmental Engineering. "Probabilistic fragility of interdependent urban systems subjected to seismic hazards." Advisor: Dr. Leonardo Dueñas-Osorio.
- Spring 2012: Keivan Rokneddin. Ph.D. Thesis Proposal, Department of Civil and Environmental Engineering. "Reliability assessment of networked urban infrastructure systems under natural hazards." Advisor: Dr. Leonardo Dueñas-Osorio.
- Summer 2011: Aarin Teague. Ph.D. Thesis Defense, Department of Civil and Environmental Engineering. "Development of a distributed water quality model using advanced hydrologic simulation." Advisor: Dr. Phillip Bedient.
- Spring 2011: Ozgur Inal. Ph.D. Thesis Defense, Department of Economics. "Essays in power system economics." Advisor: Dr. Peter R. Hartley.
- Spring 2011: Emilia Stepinski. M.S. Thesis Defense, Department of Civil and Environmental Engineering. "1D and 2D methods for modeling floodplains under storm surge conditions." Advisor: Dr. Phillip Bedient.
- Spring 2011: Srivishnu Vemuru, Ph.D. Thesis Proposal, Department of Civil and Environmental Engineering. "Seismic protection of base isolated structures with uplift using adaptive-passive and semi-active negative stiffness device." Advisor: Dr. Satish Nagarajaiah.
- Fall 2010: Dharma Pasala, Ph.D. Thesis Proposal, Department of Civil and Environmental Engineering. "Control of structural systems using novel adaptive and adaptive-passive control devices and strategies." Advisor: Dr. Satish Nagarajaiah.
- Spring 2010: Aarin Teague, Ph.D. Thesis Proposal, Department of Civil and Environmental Engineering. "Water quality alert system: Development of a water quality prediction system linked with a distributed hydrologic model Vflo for Cypress Creek watershed, Houston, Texas." Advisor: Dr. Phillip Bedient.
- Fall 2009: Kristina Dennemann, M.S. Thesis Defense, Department of Civil and Environmental Engineering. "Life-cycle cost benefit (LCC-B) analysis for bridge seismic retrofits." Advisor: Dr. Jamie Padgett.
- Fall 2009: Dharma Pasala, M.S. Thesis Defense, Department of Civil and Environmental Engineering. "Repetitive control of hysteretic systems using robust  $H_\infty$  controller." Advisor: Dr. Satish Nagarajaiah.



- Fall 2009: Tyler Ray, M.S. Thesis Defense, Department of Civil and Environmental Engineering. Flood modeling of Gulf Coast watersheds. Advisor: Dr. Phillip Bedient.
- Fall 2009: Srivishnu Vemuru, M.S. Thesis Defense, Department of Civil and Environmental Engineering. "Dynamic response of multi-degree of freedom structure with sliding isolation system and uplift." Advisor: Dr. Satish Nagarajaiah.
- Spring 2009: Bayram Aygun, M.S. Thesis Defense, Department of Civil and Environmental Engineering. "Efficient seismic fragility assessment of highway bridges on liquefiable soils." Advisor: Dr. Leonardo Dueñas-Osorio.
- Spring 2009: Brian Crouse, M.S. Thesis Defense, Department of Mechanical Engineering and Materials Science. "Autonomous optical navigation for lunar missions." Advisor: Dr. Pol Spanos.
- Fall 2008: Milton Esteva, Ph.D. Thesis Defense, Department of Mechanical Engineering and Materials Science. "Hybrid finite elements nanocomposite characterization by stochastic microstructuring." Advisor: Dr. Pol Spanos.
- Spring 2008: Chris van Tassel, M.S. Thesis Defense, Department of Mechanical Engineering and Materials Science. "Stability analysis for the Ares-I launch vehicle." Advisor: Dr. Pol Spanos.
- Spring 2008: Richard Stegemeier, M.S. Thesis Defense, Department of Civil and Environmental Engineering. "Mitigating seismic risk in developing countries: A case study on the 2005 Kashmir earthquake." Advisor: Dr. Ahmad Durrani.
- Spring 2008: Stephen Clark, Ph.D. Thesis Defense, Department of Earth and Atmospheric Sciences. "Characterizing the southeast Caribbean – South American plate boundary at 64°W." Advisor: Dr. Alan Levander.
- Fall 2007: Nick Fang, Ph.D. Thesis Defense, Department of Civil Engineering. "A dynamic hydraulic floodplain map prediction tool for flood alert in a coastal urban watershed considering storm surge issues." Advisor: Dr. Phillip Bedient.
- Spring 2007: Marco Ciarcia, Ph.D. Thesis Defense, Department of Mechanical Engineering and Materials Science. "Optimal starting conditions for the rendezvous maneuver: Analytical and computational approach." Advisor: Dr. Angelo Miele.
- Spring 2007: Ike Akinwande, M.S. Thesis Defense, Department of Civil and Environmental Engineering. "Nanocomposite strain sensors: Study of electrical and thermal properties". Advisor: Dr. Satish Nagarajaiah.
- Spring 2007: Mike Osenar, M.S. Thesis Defense, Department of Mechanical Engineering and Materials Science. "Analysis of CEV optical camera performance during lunar navigation." Advisor: Dr. Pol Spanos.
- Spring 2007: Ross Gordon, M.S. Thesis Defense, Department of Civil and Environmental Engineering. "Next generation hydraulic modeling for inundation mapping and flood warning in complex urban systems." Advisor: Dr. Phillip Bedient.

***Thesis Committees, Other Universities***

- Summer 2011: Kanoknart Leelardcharoen, Ph.D. Thesis Defense. Department of Civil and Environmental Engineering, Georgia Institute of Technology. "Interdependent response

of telecommunication and electric power systems to seismic hazard.” Co-advisors: Dr. Barry Goodno, James Craig, and Leonardo Dueñas-Osorio.

Spring 2011: Camilo Gómez Castro, Ph.D. Thesis Proposal, Department of Civil and Environmental Engineering, Universidad de Los Andes. “Risk-based decision making in complex infrastructure networks.” Co-Advisors: Drs. Mauricio Sánchez-Silva and Leonardo Dueñas-Osorio.

Spring 2007: Manuel Cabrales Camacho, M.S. Thesis Defense, Department of Civil and Environmental Engineering, Universidad de Los Andes. In Spanish: “Extrapolación de las propiedades mecánicas de materiales novedosos para uso como elementos estructurales.” Advisor: Dr. Fernando Ramírez Rodríguez.

#### ***Department of Civil and Environmental Engineering Leadership and Committees***

- Chair of the departmental curriculum focus area IV on urban infrastructure, reliability and management, January 2009 – Present.
- Member of the curriculum committee, January 2009 – Present.
- Member of the seminar series committee, August 2006 – Present.
- Member of faculty search committees, August 2006 – May 2010.

#### ***School of Engineering Tasks and Committees at Rice University***

- Member of the curriculum committee, August 2007 – Present.
- Co-reviewer of ADVANCE program applications and job presentation judge for the Department of Civil and Environmental Engineering to the workshop on “negotiating the ideal faculty position”, August 2011 and September 2012.
- Collaborator of the energy and environment task force, August 2010 – May 2011.
- Member of the international task force (global urban futures), August 2010 – May 2011.
- Member of the information science and technology committee, August 2006 – May 2008.
- Member of the urban systems and sustainability committee, August 2006 – May 2008.

#### ***University Level Engagements and Committees***

- Judge for Rice University’s centennial undergraduate poster competition, October 2012.
- Co-organizer of a display and demonstration of the Storm Risk Calculator (SRC) for Rice University’s UnConvention, April 2012. In collaboration with B. Guven, R. Stein, and D. Subramanian.
- Facilitator for one of the tables of the “Rice 2032: Building the vision in disruptive times” workshop on international and global engagements, March 2012.
- Program planning committee member for the VII De Lange conference on “Transforming the metropolis,” Houston, Texas, Spring 2008 – Spring 2009.

### **Professional Activities**

#### ***Conference and Session Organizer***

Mini-symposium on “Analytical, statistical, and simulation methods for the reliability and risk assessment of lifeline systems and associated structures”. Co-organized with Wei Liu, Tongji University. Eleventh International Conference on Structure Safety and Reliability (ICOSSAR 2013), New York, USA, June 16-20, 2013.

Panel session on “Risk-based design, maintenance and restoration of structure and infrastructure systems.” Co-organized with Therese McAllister, National Institute for

Standards and Technology (NIST). ASCE/SEI 2013 Structures Congress, Pittsburgh, Pennsylvania, USA, May 2-4, 2013.

Technical session on “Risk-based and disaster resilience of bridge systems and networked infrastructures under multiple hazards.” Co-organized with Gian P. Cimellaro, Politecnico di Torino. Sixth International Conference on Bridge Maintenance, Safety and Management (IABMAS 2012), Stresa, Italy, July 8-12, 2012.

Mini-symposium on “Risk and reliability analysis for interdependent infrastructure systems.” Co-organized with Seth Guikema, Johns Hopkins University. International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP11), Zurich, Switzerland, August 1-4, 2011.

Mini-symposium on “Probabilistic models and methods for risk assessment of lifeline networks and decision support.” Co-organized with Junho Song, University of Illinois at Urbana-Champaign. International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP11), Zurich, Switzerland, August 1-4, 2011.

Mini-symposium on “Resilience assessment of communities and infrastructures.” Co-organized with Gian P. Cimellaro, Politecnico di Torino. Third international conference on computational methods in structural dynamics and earthquake engineering (COMPDYN 2011), Corfu, Greece, May 26-28, 2011.

Technical session on “Seismic reliability and performance assessment of bridges.” Co-organized with Jamie E. Padgett, Rice University. ASCE/SEI Structures Congress 2011, Las Vegas, Nevada, USA, April 14-16, 2011.

Technical session on “Resilience of structures, infrastructures, and communities under seismic hazard.” Co-organized with Gian Paolo Cimellaro, Politecnico di Torino. ASCE/SEI Structures Congress 2011, Las Vegas, Nevada, USA, April 14-16, 2011.

Workshop on “Cascading disasters and resilience to hurricanes.” Co-organized with Robert Stein and Devika Subramanian, Rice University. Hurricane risk and evacuation behavior research groups at Rice University and Texas A&M University, Houston, Texas, March 25, 2011.

Workshop on “Challenges and opportunities for lifeline systems engineering.” Co-organized with Curtis Edwards, PSOMAS. 2011 EERI Annual Meeting, San Diego, California, February 9-12, 2011.

Panel session on “Emerging risks for infrastructure systems.” Co-organized with Bruce Ellingwood, Georgia Institute of Technology. ASCE/SEI Structures Congress 2010, Orlando, Florida, USA, May 12-14, 2010.

Technical session on “Innovative bridge system reliability.” Co-organized with Jamie Padgett, Rice University. ASCE/SEI Structures Congress 2010, Orlando, Florida, USA, May 12-14, 2010.

Technical session on “System reliability, risk and decision making.” Co-organized with Junho Song, University of Illinois at Urbana-Champaign. Tenth International Conference on Structural Safety and Reliability (ICOSSAR 2009), Osaka, Japan, September 13-17, 2009.

Technical session on “Interdependent lifeline systems.” Technical Council on Lifeline Earthquake Engineering (TCLEE) conference, Oakland, California, June 28 - July 1, 2009.

**Professional and Scientific Advisory Activities**

**University of Liverpool and the American Society of Civil Engineers (ASCE):** Member of the scientific committee of the second international conference on vulnerability and risk analysis and management (ICVRAM 2014) and sixth international symposium on uncertainty modeling and analysis (ISUMA 2014), Liverpool, United Kingdom, July 13-16, 2014.

**Earthquake Engineering Research Institute (EERI):** Member of the seismic resilience panel to support a seismic resilience observatory for the learning from earthquakes program (LFE), Oakland, California, USA, October 2012 – April 2013.

**Engineering Mechanics Institute (EMI) of the American Society of Civil Engineers (ASCE):** Member of the scientific committee. 2012 Joint Conference of the Engineering Mechanics Institute and the 11<sup>th</sup> ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability (EMI/PMC 2012), Notre Dame, Indiana, USA, June 17-20, 2012.

**American Wind Energy Association (AWEA) and the American Society of Civil Engineers (ASCE):** Member and secretary of the wind turbine tower structures subgroup. Focus on defining wind tower load combinations for operational and seismic loads and recommended practices. June 2010 – Present.

**Civil Engineering Risk and Reliability Association (CERRA):** Member of the scientific committee. International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP11), Zurich, Switzerland, August 1-4, 2011.

**National Research Council (NRC):** Member of the post-event response and recovery and lifelines discipline groups. Grand challenges in earthquake engineering research: A community workshop, Irvine, California, USA, March 14-16, 2011.

**Earthquake Engineering Research Institute (EERI) and the National Science Foundation (NSF):** Representative of the lifeline systems community for the Chile research needs workshop to identify research opportunities and priorities following the February 27, 2010 earthquake, Alexandria, VA, August 19, 2010.

**Technical Council on Lifelines Earthquake Engineering (TCLEE) of the American Society of Civil Engineers (ASCE):** Member of the earthquake investigation team after the 27 February 2010 Mw 8.8 Offshore Maule, Chile seismic event. Led the interdependent lifeline system recovery data collection and analysis tasks. Concepción, Talcahuano, Talca, and Santiago, Chile, April 9-18, 2010.

**National Research Council (NRC):** Member of the lifeline systems committee for the workshop on national earthquake resilience—research, implementation, and outreach. Irvine, California, August 17-18, 2009.

**Select Research and Education Impact**

**European Union (EU):** To quantify the effects of interdependencies across electricity and gas networks at the continental scale, the EU's Institute for the Protection and Security of the Citizen commissioned a study to European researchers, whose outcomes are detailed in a 2010 Joint Research Centre report that builds upon the interdependency models from Dr. Dueñas-Osorio's research group. The report (LB-NA-24275-EN-N) is available from the Office of Publications of the European Union, where the presented methodology for interdependent risk assessment addresses not only engineers but also EU policy-makers.

**Office of Public Safety and Homeland Security of the City of Houston:** To inform Houston citizens about their risks or consequences from exposure to wind, rainfall, surge, and power outages as induced by severe weather, Dr. Dueñas-Osorio's research team contributed to the development of a practical online tool called the Storm Risk Calculator (SRC), which was officially launched by the City of Houston in June of 2012 to aid with hurricane preparedness (details and video at: <http://news.rice.edu/2012/06/06/houston-unveils-storm-risk-calculator-for-2012-hurricane-season-2/>). The tool was built in collaboration with Dr. B. Guven at the Houston Advanced Research Center, Dr. R. Stein, professor of Political Science, Dr. Devika Subramanian, professor of Computer Science, and the SSPEED Center all at Rice University, as well as with Houston-based LJA Engineering.

**Disciplines Outside Civil and Environmental Engineering:** The aggregate research output from Dr. Duenas-Osorio's group has been noted in different fields that include Statistical Physics, Network Science, Complexity Theory, Computer Science, Social Science, and Electrical and Electronic Engineering, among others. Sample journals or periodicals outside civil engineering citing his group's research include *Complexity*, *Lecture Notes in Computer Science*, *Nonlinear Dynamics*, *Physica A*, *Transportation Research Part F*, as well as different conferences, several from the Institute of Electrical and Electronic Engineers (IEEE), spanning topics in computing, control, logistics, and systems research.

**General Public:** The September 22, 2012 issue of *Science News*, a magazine of the Society for Science and the Public, highlights in its featured article entitled "when networks network" the research insights from Dr. Duenas-Osorio's group in a subsection dedicated to "better [networked] systems". The article by science writer Elizabeth Quill showcases the state of the art in research and applications related to interdependent networks. Research from physicists, mathematicians and engineers is covered, thus providing a holistic view of the challenges and opportunities posed by coupled large scale systems and the need to continue a multidisciplinary approach to tame distributed networks and benefit society.

### **Current Research Collaborators (past five years)**

**Jack Baker**, Assistant Professor, Department of Civil and Environmental Engineering, Stanford University. Probabilistic and spatially distributed hazards for infrastructure systems, Spring 2011 – Present.

**Phillip Bédient**, Professor, Department of Civil and Environmental Engineering, Rice University, and **Jason Christian**, Assistant Professor, College of Engineering, University of Georgia. Coupled probabilistic rainfall and surge flood assessment for Houston watersheds, Spring 2009 – Present.

**James I. Craig**, Professor Emeritus, Department of Aerospace Engineering, Georgia Institute of Technology. Modeling of interdependence across power and telecommunication systems, Spring 2006 – Present.

**Reginald DesRoches**, Professor, Department of Civil and Environmental Engineering, Georgia Institute of Technology. Reliability assessment of bridge components and bridge systems, Spring 2006 – Present (intermittent).

**Bruce R. Ellingwood**, College of Engineering Distinguished Professor, Department of Civil and Environmental Engineering, Georgia Institute of Technology. Power distribution system reliability and risk-based assessment methods, Spring 2006 – Present (intermittent).

**Barry J. Goodno**, Professor, Department of Civil and Environmental Engineering, Georgia Institute of Technology. Modeling of interdependence across power and telecommunication systems, Spring 2006 – Present.

**Birnur Guven**, Research Scientist, Houston Advanced Research Center (HARC). Statistical modeling of hurricane evacuation behavior and preparedness, Spring 2011 – Present.

**Qilin Li**, Associate Professor, Department of Civil and Environmental Engineering, Rice University. Optimization of reliability, topology, energy, and water quality for modern potable water transmission and distribution systems, Fall 2009 – Present.

**Alexis Kwasinski**, Assistant Professor, Department of Electrical and Computer Engineering, University of Texas, Austin. Interdependencies between power and telecommunication systems before and after disasters, Spring 2010 – Present.

**Jamie E. Padgett**, Assistant Professor, Department of Civil and Environmental Engineering, Rice University. Reliability assessment of bridges and bridge networks, Fall 2007 – Present.

**Javier Rojo**, Professor, Department of Statistics, Rice University. Theoretical modeling of power distribution system reliability, Fall 2006 – Present.

**Mauricio Sanchez-Silva**, Professor, Department of Civil and Environmental Engineering, Universidad de Los Andes. Systems and network approaches to effective infrastructure decision making, Spring 2006 – Present.

**Junho Song**, Associate Professor, Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign. Closed-form methods for infrastructure system decision making, Spring 2011 – Present.

**Robert Stein**, Lena Gohlman Fox Professor, Department of Political Science, Rice University. Investigation of behavioral responses of citizens to impending severe weather, Fall 2007 – Present.

**Devika Subramanian**, Professor, Department of Computer Science, Rice University. Artificial intelligence models for hurricane fragility assessment of wood frame houses, Fall 2007 – Present.

### **Past Research Collaborators**

**Michael H. Faber**, Professor, Department Head, Department of Civil Engineering, Technical University of Denmark. Modeling of complex infrastructure systems and stakeholders, Spring 2012.

**Biswajit Basu**, Professor, Department of Civil and Environmental Engineering, Trinity College, Dublin. Probabilistic unavailability of wind turbines, Fall 2006 – Spring 2007.

### **Summary of Other Skills and Professional Development**

- Proficiency in written and spoken languages: Spanish, English.
- Adequacy in written and spoken languages: Italian, French.
- Programming skills: ANSI C, PERL, Visual Basic, Java, D2K, TCL, Matlab, R, LaTeX.
- Knowledge of software packages related to structural engineering, earthquake engineering, loss assessment, GIS, system reliability, statistics, networks, and applied mathematics.
- Implementation and usage of modern educational tools for comprehensive lecture and handwriting capturing for dissemination, such as Panopto.
- Enrollment in “Quantum Mechanics and Quantum Computation” as an introduction to explore the exponential power of computers based on quantum principles. Course offered by Coursera, Fall 2012.