DR. MARC L. LEVITAN

BIOGRAPHICAL SUMMARY

Dr. Marc Levitan has been actively engaged in wind engineering research, practice, technology transfer, and education and leadership for over 25 years.

Leadership Experience

Dr. Levitan currently serves as the Acting Director for the National Windstorm Impact Reduction Program (NWIRP). In this role, he is responsible for leadership of a multiagency[1] Federal Program whose mission is to produce "major measureable reductions in loss of life and property due to windstorms." Dr. Levitan led development of the NWIRP Strategic Plan, which will be published for Public Comment in early 2017, prior to submission to Congress. The Plan identifies the wide range basic and applied research, development, education and outreach actions necessary to meet the Program's mission. He is also responsible for coordination of Federal post-windstorm investigations. Toward that end, has been working with NOAA developing an MOU for joint agency post-tornado field deployments, and with the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) to improve national plans for post-storm data collection.

Since 2011, Dr. Levitan has also led R&D programs in wind engineering and coastal inundation at the National Institute of Standards and Technology (NIST). His research unit has made significant contributions in areas such as computational wind engineering, database-assisted design, and joint probabilities of hurricane wind and storm surge hazards. Dr. Levitan led a team that developed new design wind speed maps for the United States, incorporating a number of technical advances. These new maps have been approved for inclusion in the ASCE 7-16 standard and the 2018 International Building Code. Dr. Levitan oversaw the retrofit and commissioning of an existing aerodynamic wind tunnel into a boundary layer experimental facility, and the acquisition of a half million dollar computing cluster to support research in computational fluid dynamics applications in wind engineering. In fiscal year 2016, his research team comprised eight research engineers and post-doctoral research associates, one NIST Fellow, one Guest Researcher (a PhD student), and several Summer Undergraduate Research Fellow (SURF) and Summer High School Intern Program (SHIP) students, with a total budget of approximately $4.3M.

Dr. Levitan served as the lead investigator for the National Construction Safety Team that conducted the technical investigation of the May 2011 EF-5 tornado that devastated Joplin, Missouri, and a preliminary reconnaissance of the May 2013 EF-5 tornado in Moore, Oklahoma. Implementing the recommendations from these tornado studies, Dr. Levitan is leading an effort to produce no less than a complete paradigm shift in how tornadoes are considered in the design of conventional buildings. Toward that end, he has successfully developed and proposed numerous changes to building codes, standards, and guidelines in the past three years. He co-leads a multimillion dollar, multi-year R&D effort to develop a performance-based design methodology for tornado hazards intended for incorporation in ASCE 7-22, including a new generation of tornado hazard maps.

Prior to joining NIST, Dr. Levitan served on the Civil and Environmental Engineering faculty at Louisiana State University (LSU). He founded the LSU Hurricane Center and served as its Director for a period of 10 years. During that time, the Center became one of the premiere interdisciplinary research units at Louisiana State University, addressing hurricanes and other natural hazards and their impacts on the natural, built, and human environments. Faculty and students from over 20 departments at LSU participated in

[1] NWIRP agencies include the National Science Foundation (NSF), the National Oceanographic and Atmospheric Administration (NOAA), the National Institute of Standards and Technology (NIST), and the Federal Emergency Management Agency (FEMA).

research and academic projects and programs initiated by the LSU Hurricane Center. The Center averaged nearly a million dollars a year in research grants and contracts, from a wide range of sources including Federal, State, and local government agencies, nonprofit organizations, and the private sector.

Dr. Levitan also spent five years as the first Managing Director of the Wind Engineering Research Field Laboratory (WERFL) at Texas Tech University, studying wind effects on full scale buildings. He led a large team of graduate and undergraduate students that designed, constructed, and instrumented the original field laboratory. He designed and built all of the data acquisition, data analysis, validation, and data archival systems, and managed much of the research conducted at WERFL during the early years.

In addition to the above activities, Dr. Levitan has provided national leadership in wind engineering through chairing national technical and policy committees; chairing national and international conferences and workshops; service on boards of technical organizations, and testimony before Congressional and state legislative committees on wind hazards, disasters, and mitigation. He served as President of the American Association for Wind Engineering, and chaired the 10th Americas Conference on Wind Engineering. He served for several years on the Board of Directors and also as Vice-President of the Applied Technology Council (a nonprofit R&D corporation). Dr. Levitan's activism on the Board helped expand ATC activities from earthquake-centric to include wind and flood hazards. He currently serves on the Executive Committee for VORTEX-SE, a joint NOAA/NSF tornado research program. Dr. Levitan has testified before several United States Senate and House committees on wind hazard mitigation, and provided congressional briefings on hurricane and tornado disasters and building code issues. He has testified in support of adoption of modern building codes at state legislative hearings in Louisiana and Mississippi. He also served on the Board of the Louisiana Emergency Preparedness Association for many years. Highlights of Dr. Levitan's national technical committee activities include service on: the ASCE 7 Main committee, Wind Load subcommittee, Flood Load subcommittee, and General Requirements subcommittee; the ASCE National Infrastructure and Research Policy Committee (past Chair); the ASCE Aerodynamics Committee (past vice-Chair); the ASCE Wind Loads on Petrochemical Structures Task Committee (past Chair), the ASCE Tornado Wind Speed Estimation Standards Committee (co-Chair), and the ICC/NSSA Storm Shelter Standards Committee (past Chair).

Research Experience

Working with multidisciplinary teams, Dr. Levitan has coauthored landmark publications in several areas, including: hurricane evacuation policies; Hurricane Katrina's impacts on medical care and the medical community; and the 2011 Joplin Tornado. The LSU Hurricane Center's extensively cited National Review of Hurricane Evacuation Plans and Policies[2] and two follow-up journal articles provided the first rigorous academic treatment of hurricane evacuation from a transportation engineering perspective. The Federal Highway Administration purchased 1,000 copies of this report, which was widely distributed within federal and state transportation and emergency management agencies. In a collaboration between the LSU Department of Social Work, the LSU Ag Center, and the LSU Hurricane Center, Dr. Levitan coauthored a book[3] to share the experiences of the Louisiana medical community during and after Hurricanes Katrina and Rita. This book received broad distribution, along with associated briefings and training materials, to improve disaster preparedness among physicians and the health care community. The NIST report[4] on the technical investigation of the single deadliest tornado since the beginning of official record keeping in 1950

[2] B. Wolshon, E. Urbina, and M. Levitan, National Review of Hurricane Evacuation Plans and Policies, LSU Hurricane Center, 2001. 34 p. http://www.ops.fhwa.dot.gov/weather/best_practices/LSUevacuationReview2002.pdf

[3] C. Guin, L. Robinson, E. Boyd, and M. Levitan, Health Care and Disaster Planning: Understanding the Impacts of Disasters on the Medical Community, Louisiana State Medical Society. Baton Rouge, Louisiana, 2009. 122 p. http://c.ymcdn.com/sites/lsms.org/resource/resmgr/Docs/Health-Care-Disaster-Plannin.pdf.

[4] E. Kuligowski, F. Lombardo, L. Phan, M. Levitan, D. Jorgensen, Final Report - National Institute of Standards and Technology (NIST) Technical Investigation of the May 22, 2011, Tornado in Joplin Missouri. NCSTAR 3, 2014. 494 p. https://dx.doi.org/10.6028/NIST.NCSTAR.3.

was the product of a three-year collaboration between a meteorologist, two wind engineers, a structural engineer, and a disaster sociologist. It's the first study to incorporate detailed examination of storm characteristics, building and infrastructure performance, emergency communication, and human behavior - and assessments of the impact of each on injury or death. The recommendations in this report provide a roadmap of actions to reduce loss of life and property in tornadoes. In total, Dr. Levitan has nearly 100 publications, in journals, conference proceedings, and other venues.

Dr. Levitan has studied wind effects on buildings and structures through post-storm investigations, wind tunnel experiments, full-scale tests, and analytical studies. Field investigations include documenting performance of buildings and other structures, shelters, and infrastructure following Hurricanes Elena, Andrew, Opal, Isabel, Charley, Ivan, Katrina, Rita, Gustav, and Ike, the May 2003 Tornado outbreak in the Midwest, and violent tornadoes including Tuscaloosa (2011), Joplin (2011), and Moore (2013). He co-founded the LSU Wind Tunnel Laboratory and led a number of research projects using that facility. While at LSU, he was the lead investigator or co-investigator on more than 40 funded projects totaling $7.7M.

Improving the tools for collection of surface level wind and storm surge data during extreme wind events represent another area of research for Dr. Levitan, complementing his post-storm investigations. At LSU, he led a large team of students and faculty advisors that designed and constructed mobile, hurricane hardened towers (one 10m and one 25m tall) for deployment ahead of landfalling storms, to capture data on meteorological conditions and wind turbulence in hurricanes. He also led a team that developed and constructed an improved prototype storm surge sensor, funded by Louisiana Sea Grant. He is one of the co-founders of the Digital Hurricane Consortium (DHC), a collaboration of several of the leading universities with active programs to conduct measurements and experiments on landfalling hurricanes, and hosted and co-chaired the inaugural DHC Symposium. Dr. Levitan currently co-chairs the Working Group for Disaster Impacts and Plans/Weather and Water Data (WG/DIAP), which develops and maintains the federal disaster data collection plan. He also co-chairs an American Society of Civil Engineers (ASCE) committee developing a new standard on tornado wind speed estimation. The scope of this standards development activity includes revision and expansion of the Enhanced Fujita Scale, as well as standardization other wind speed estimation methods including radar, forensic engineering, and post-storm aerial and satellite imagery.

Hurricane and tornado sheltering are other areas in which Dr. Levitan has made significant contributions. He has conducted research in performance, assessment, and design of storm shelters and other critical facilities, and applied this knowledge to pre- and post-disaster evaluation of numerous shelters and best available refuge areas for schools, hospitals, nursing homes, emergency operations centers, conference facilities, and other building types, for federal, state and local governments as well as nongovernmental agencies. He chaired the International Code Council/National Storm Shelter Association committee that developed the first consensus national standard for the design and construction of storm shelters (ICC 500: 2008). He worked extensively with FEMA on major updates to the most recent editions of guidelines for design of residential and community safe rooms (FEMA 320 and 361, respectively). He successfully developed and proposed code changes requiring storm shelters in any new construction or additions to buildings on existing school campuses in tornado prone regions, which will be published in the 2018 International Building Code and 2018 International Existing Building Code. He also led a successful effort to create extensive requirements and guidance for selection of existing buildings as shelters for many different natural hazards in the forthcoming NFPA 1616 Standard for Mass Evacuation and Sheltering, to be published by the National Fire Protection Association in January 2017.

Dr. Levitan's work in the area wind loads on industrial and petrochemical structures has also had significant impact. Current design practices are based in large part on his research, which includes wind tunnel testing and analysis of the aerodynamically unique and complex structures found in the process industries, such as open frame structures, pipe racks, vessels, and partially clad structures. Since its inception in 1993, he has served on or chaired the ASCE Energy Division task committee that wrote the first and second edition guidelines that extended the wind load procedures in ASCE 7 to cover many additional structure types. The

guidelines published by this ASCE committee have become a de facto standard in the petrochemical industry.

Other areas where Dr. Levitan has conducted research include: tornado climatology; performance-based design for tornadoes and hurricanes; use of airborne and satellite-based imagery for hurricane, tornado, and storm surge damage detection; application of storm surge models to design of coastal structures; wind and storm surge damage modeling; hurricane evacuations; flood casualty modeling; application of flood damage, wind damage and casualty models for planning and for real-time operational response and search and rescue missions; and interaction of engineering and emergency management.

Dr. Levitan has also provided expert consulting services on a wide array of topics, such as: site specific wind speed analysis and wind load analysis; forensic investigations of buildings following extreme winds and hurricanes; hurricane shelter assessments; and adequacy of hurricane emergency response plans. These projects have included educational, institutional, industrial, petrochemical, and transportation facilities, mid-rise office buildings, factories, hospitals, emergency operations centers, and a $200M class action lawsuit by 3,600 families who lost their homes during Hurricane Ike. With several of his graduate students, he helped found a successful consulting firm in Baton Rouge, focused on hurricane engineering, natural hazard risk assessment, and mitigation.

Teaching Experience

The academic pursuits of Dr. Levitan have been in the fields of engineering for natural hazards and structural engineering. With support from the National Science Foundation, he led a large multidisciplinary team that developed the first curricular materials for the field of Hurricane Engineering and taught five new courses. He co-founded the LSU Disaster Science and Management program - a unique and interdisciplinary science and technology-oriented academic program in emergency management. Dr. Levitan led the creation of a Structural Engineering undergraduate minor within the Civil and Environmental Engineering Department at LSU, and served as its faculty advisor for over a decade. He also served as the faculty advisor for the LSU ASCE Student Chapter and the LSU Student Steel Bridge Team for several years. Dr. Levitan's excellence in the classroom has been recognized through teaching awards from Texas Tech, LSU, and Chi Epsilon. With respect to graduate education, he has served as the major professor and mentor for more than 25 Masters and PhD students in the fields of Civil Engineering, Engineering Science, and Geography.

Dr. Levitan's contributions to teaching, research, and leadership have been recognized on several occasions. He was awarded the Charles P. Siess, Jr. Endowed Professorship in the year 2000 by the LSU College of Engineering, which he maintained until departing LSU in 2011. Other recognition includes:

- NIST Engineering Laboratory Communication Award, 2015
- Best Paper of the Year Award, Risk Analysis: An International Journal, 2009
- LSU College of Engineering Dean's Book Award, 2009
- LSU Alumni Association Faculty Excellence Award, 2007
- Texas Tech University, Inducted into the Civil Engineering Academy, 2007
- Baton Rouge Business Report's Business Plan Competition Winner, 2006
- LSU Department of Civil and Environmental Engineering Faculty Achievement Award, 2005
- LSU ASCE Student Chapter Outstanding Professor Award, 1997-98
- LSU Department of Civil and Environmental Engineering Teacher of the Year Award, 1997
- Chi Epsilon Southern District, James M. Robbins Excellence in Teaching Award, 1995
- Chi Epsilon Excellence in Teaching Award, Louisiana State University Chapter, 1994-1995
- Texas Tech University College of Engineering Outstanding Graduate Instructor Award, 1990
- Sigma Xi, The Scientific Research Honor Society, member since 1989