Urban Engineering: New Strategies for a Resilient and Sustainable Future

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ABSTRACT

A confluence of opportunities and national and international grand challenges are influencing current directions in the design of urban regions as populations expand. This presentation will summarize new developments to create resilient and sustainable cities through research on the built environment across several themes. Resilient engineering highlights research on the use of structural systems that are able to be returned to use quickly after extreme events. Design for Deconstruction presents the development of new sustainable structural systems that may be dismantled and reused at the end of their useful life, rather than scrapped or recycled. Offshore wind energy highlights research on new solutions for energy generation through offshore wind that would place Massachusetts at the leading edge of renewable energy generation in the U.S. Autonomous robotic inspection presents research on robotic unmanned aerial vehicles that are designed to autonomously capture the complete geometry of structures and enable automatic detection of their damage after major events. Urban engineering summarizes approaches for conducting regional simulations to predict the impacts and opportunities across urban regions that are designed with more sustainable and resilient civil engineering solutions. By directly addressing resilience and sustainability in structural design and regional assessment, this work offers insights into how engineering innovations can be used to create a new generation of solution for urban regions.

BIOGRAPHY

Jerome F. Hajjar is the CDM Smith Professor and Department Chair in the Department of Civil and Environmental Engineering at Northeastern University. He is also the Director of the Laboratory for Structural Testing of Resilient and Sustainable Systems (STReSS Laboratory). He has served as Chair of the Structures Faculty and Deputy Director of the Mid-America Earthquake Center at the University of Illinois at Urbana-Champaign; was a faculty member at the University of Minnesota; and was a structural engineer and Associate at Skidmore, Owings & Merrill. His research and teaching interests include analysis, experimental testing, and design of steel and composite steel/concrete building and bridge structures, regional modeling and assessment of infrastructure systems, and earthquake engineering, and he has published over 200 papers and edited three books on these topics. Hajjar serves on the American Institute of Steel Construction (AISC) Committee on Specifications and several of its task committees, is the chair of the American Society of Civil Engineers (ASCE) Department Heads Coordinating Council, and is on the Board of Governors of the ASCE Structural Engineering Institute (SEI). He was made a Fellow of ASCE in 2007 and of SEI in 2013, and was awarded the 2016 ASCE Moisseiff Award, the 2010 *Popular Mechanics* Breakthrough Award, the 2009 ASCE Shortridge Hardesty Award, the 2005 AISC T. R. Higgins Lectureship Award, the 2004 AISC Special Achievement Award, the 2003 ASCE Walter L. Huber Civil Engineering Research Prize, and the 2000 ASCE Norman Medal for his research on steel structures, composite construction, structural stability, and earthquake engineering. Dr. Hajjar is a registered professional engineer in Illinois and Minnesota.