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**Engineering for Extremes: A Nexus of Modeling, Simulation,  
Virtualization and Living Laboratories**

koje će održati

**Prof. Ahsan Kareem**

*University of Notre Dame, Indiana, USA*

u utorak, 2. srpnja 2019. u 11:00 sati

u dvorani Knjižnice Hrvatske akademije znanosti i umjetnosti

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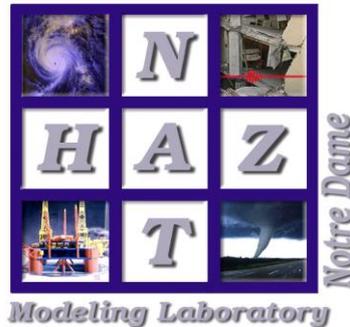
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# **Engineering for Extremes: A Nexus of Modeling, Simulation, Virtualization and Living Laboratories**

**Professor Ahsan Kareem**

**NatHaz Modeling Laboratory, University of Notre Dame, USA**



## **Abstract**

Current worldwide urbanization requires taller buildings, long-span bridges for connecting communities and drilling platforms that extend to depths in thousands of meters of water. As a result, a new generation of tall buildings, long-span bridges, and deepwater drilling platforms is evolving. These superstructures are very flexible and remarkably sensitive to the dynamic action of extreme wind events like bora, hurricanes, winter storms, thunderstorms and other similar events. Designing these structures in increasingly complex wind environments is challenging to ensure their functionality and safety.

The lecture will provide an interesting guided tour of the evolution of these engineering structures and their sensitivity to extreme wind events. To meet the challenges of designing and building these structures there is a growing need for a new design methodology that implements the advantages of a nexus of new modeling procedures, physical and computational simulations, virtualization and machine learning. This approach also benefits from the real-time structural analysis through a network of instrumented structures that serve as living laboratories.

The lecture presents such a platform to better address the fundamental issues related to the analysis, modeling, and simulation of wind load effects on these structures and their performance at full-scale. The role of visualization in physical and computational simulations and the unprecedented ability of machine learning algorithms to classify and predict complex environments will be presented with examples related to the modeling of the extreme environment.

**Ahsan Kareem** is the Robert M. Moran Professor of Engineering and the Director of the NatHaz Modeling Laboratory at the University of Notre Dame, USA. His work focuses on characterization and formulation of dynamic load effects due to wind, waves and earthquakes on tall buildings, long-span bridges, offshore and other engineering structures via fundamental laboratory and full-scale measurements utilizing cyber and cyber-physical infrastructures.

He is elected President of the International Association for Wind Engineering (IAWE). He has been awarded numerous honors, including the US Presidential Young Investigator Award from the White House Office of Science and Technology. A recipient of ASCE's: Theodore von Kármán Medal, Masanobu Shinozuka Medal, James Croes Medal, Robert H. Scanlan Medal, Jack E. Cermak Medal, State-of-the-Art Award, inducted to the Offshore Technology Conference Hall of Fame and Distinguished Member of ASCE; Alan G. Davenport Medal of IAWE; Distinguished Research Award of IASSAR (International Association for Structural Safety and Reliability); the University of Notre Dame.

He has served as a High-End Foreign Expert at Tongji University, China and delivered the 2013 Scruton Lecture at the Institute of Civil Engineers, London, UK. He has been appointed Honorary Professor at several universities in Asia, serves on the Editorial Board of several international journals and has recently co-authored two books. He is an elected member of the US National Academy of Engineering, a foreign member of the Indian Academy of Engineering and Chinese Academy of Engineering.

