

Performance-Based Hurricane Engineering (PBHE) methodology under current and changing climate conditions

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Abstract:

Hurricanes are among the most costly natural hazards affecting communities worldwide, in terms of both property damage and loss of life. The landfall of a hurricane involves different hazard sources (i.e., wind, windborne debris, flood, and rain) that interact to generate the hazard scenario for a given structure. Hence, a novel multi-hazard methodology is required to accurately estimate the risk due to hurricanes and to provide easily interpreted guidance to insurers, emergency administrators, builders, and owners on how to reduce potential losses. This presentation will illustrate a novel probabilistic Performance-Based Hurricane Engineering (PBHE) framework that is based on the total probability theorem. The proposed framework disaggregates the risk assessment analysis into independent elementary components and innovatively accounts for concurrent and interacting hazard sources as well as for their possible sequential effects. This presentation will demonstrate how the PBHE framework can be used for the loss analysis of single-family housing in the US Gulf Coast through a cost/benefit comparison of different hazard mitigation techniques. A projection model for future hurricane wind hazard under changing climate conditions will be presented, and the effects of different climate change scenarios on expected losses will also be discussed.



Bio:

Dr. Michele Barbato is a Professor in the Department of Civil & Environmental Engineering at the University of California, Davis. He received his Summa Cum Laude “Laurea” degree in Civil Engineering from the Sapienza University of Rome (Rome, Italy) in 2002, and his M.S. and Ph.D. in Structural Engineering in 2005 and 2007, respectively, at the University of California, San Diego. He is a licensed PE in Louisiana and in Italy.

He is an expert in both traditional and innovative construction methodologies and materials, with particular emphasis on new recycled and green materials. He is active in the development of performance-based methodologies in earthquake, wind, and hurricane engineering, as well as in multihazard applications. Dr. Barbato’s research also embraces nonlinear finite element modeling and analysis of structural systems, random vibration theory, structural reliability analysis, multihazard assessment and mitigation under current and changing climate conditions, and life-cycle cost optimization of resilient/sustainable structures subject to multiple hazards.

He is the author of more than 200 technical publications. He received the 2007 ICASP10 Overseas Student Scholarship, the 2009 ASCE Moisseiff award, the 2011 European Association of Structural Dynamics Junior Research Prize, the ISSE-12 Best Paper Award for Young Experts, and the 2020 ASCE Sacramento Section Fredrick Panhost Structural Engineer Award, as well as several teaching and service awards. He was elected SEI Fellow and EMI Fellow in 2019, and ASCE Fellow in 2021. He recently received the 2020 Walter L. Huber Civil Engineering Research Prize. Dr. Barbato has served as the Chair of the ASCE EMI Dynamics Committee in 2017-2020, and currently is the Chair of the ASCE SEI Multihazard Mitigation Committee, the vice-Chair of the ASCE SEI Performance Based Design of Structures Committee, an associate member of the ASCE 7-22 Wind Loads Subcommittee, and a member of the EMI Board of Governors.

Monday, April 19th, 2021 4:00 – 5:00 p.m. (CDT)

Join us: <https://go.cee.illinois.edu/Seminar-by-Dr-Barbato>