Northeastern

Department of Civil and Environmental Engineering Distinguished Seminar Series

From elements to systems and from collapse to resilience under extreme events

Mehrdad Sasani, PhD
Associate Professor
Department of Civil & Environmental Engineering
Northeastern University, Boston, MA

Monday, November 28, 2016 12:00 pm-1:00pm
458 Richards Hall

Abstract

Behavior of critical elements up to complete failure needs to be modeled for analyzing response of structures under extreme events. Such modeling should represent the element's behavior as part of the structure affected by the event. For complex element response there is a need for conducting experiments with realistic boundary conditions in order to characterize and model their behavior. This would allow for collapse resistance analysis of structural systems under extreme manmade and natural hazards, which is particularly important for evaluating response of existing structures that are susceptible to failure under extreme events. Such element and system level responses will be described and evaluated in this presentation in the context of collapse analysis.

Collapse prevention is perhaps the most important performance criteria for buildings and structures. In fact, the main objective of building codes and standards has been providing life-safety and collapse prevention. One important limitation, however, is that the need for buildings' (partial) functionality after adverse events is not addressed. Recently, there has been a significant interest in developing methodologies for increasing the community and societal resilience to natural and manmade hazards. Resilience can be defined as the ability of different social units to minimize the impact of, adapt to and recover from adverse events. The current codes and standards do not aim for achieving optimum values of building resilience metrics such as percent functional after hazard, time to recover, and cost of repair. Designing new resilient buildings and structures require methodologies that would explicitly consider resilience metrics. Describing code limitations, a multi-level and multi-hazard resilience-based design framework will be discussed in this presentation.

Biographical Sketch

Mehrdad Sasani's research interests include progressive collapse of structures, earthquake engineering, and structural integrity and reliability. He has pioneered field experimentation and analytical modeling and evaluation of collapse resistance of actual structures. He is a recipient of the NSF Career Award. He has also conducted seismic hybrid simulations of structures subjected to severe seismic ground motions. He is conducting research on building resilience under multiple hazards. He is members of three standard committees of ASCE: Risk and Resilience Measurements Committee of Infrastructure Resilience Division; ASCE 41 Committee on Seismic Retrofit of Existing Buildings Standards, SEI Codes &

Standards Division; and Disproportionate Collapse Mitigation of Building Structures Standards. Sasani is the chair of American Concrete Institute committee 377: Performance-Based Structural Integrity & Resilience of Concrete Structures. He is also the chair of Massachusetts Engineers and Architects Emergency Response (MEAER) committee. Sasani is a recipient of 2016 BSCES/ASCE Clemens Herschel outstanding paper award.

Mehrdad Sasani, PhD

Associate Professor, Department of Civil & Environmental Engineering

Northeastern University, Boston, MA

Northeastern University

Education

- **Ph.D., Structural Engineering, University of California at Berkeley**
- **M.S., Structural Engineering, Tehran Polytechnic**
- **B.S., Civil Engineering, Tehran Polytechnic**

Research Interests

- **Progressive Collapse of Structures**
- **Earthquake Engineering**
- **Concrete structures**
- **Structural Integrity and Reliability**

Selected Service and Awards

- **BSCES/ASCE Clemens Herschel outstanding paper award, 2016**
- **Fellow of the American Society of Civil Engineers, 2015**
- **Fellow of Structural Engineering Institute of the American Society of Civil Engineers, 2015**
- **CAREER Development Award, National Science Foundation, 2006**
- **Chair of Massachusetts Engineers and Architects Emergency Response (MEAER) committee**