Northeastern

Department of Civil and Environmental Engineering

Seismic Retrofit of Structures Using Shape Memory Alloys and Innovative Systems

Reginald DesRoches, PhD
Karen and John Huff School Professor and Chair
School of Civil & Environmental Engineering,
Georgia Institute of Technology, Atlanta, GA

Thursday, February 27th, 2013
12pm-1pm
168 Snell Engineering

Abstract

The recent earthquakes in Japan, New Zealand, and Chile underscore the importance of developing new approaches and technologies to improve the performance of structures during earthquakes. The presentation will highlight the application of several innovative retrofit approaches for mitigating the effects of earthquakes in buildings and bridges. One class of retrofits uses Nitinol shape memory alloys. Shape memory alloys are a unique metallic alloy which can undergo large deformations while reverting back to their original, undeformed shape. This unique property has led to the development of applications in the biomedical, aerospace, and commercial industry. Another class of sustainable retrofit systems are developed that are scalable, adaptable, cost-effective, and do not require heavy machinery to implement. A multi-scale and multi-disciplinary approach is taken to explore the potential use of these systems for applications in earthquake engineering. Complementary analyses show great potential for these systems to improve the earthquake performance of nonductile buildings and bridges.

Bio

Reginald DesRoches is the Karen and John Huff School Chair, and Professor of Civil and Environmental Engineering at the Georgia Institute of Technology. His primary research interests are design of buildings and critical infrastructure under earthquake loads, and seismic risk assessment. He has a particular interest in mitigating the impacts of earthquakes in the Caribbean and Western Africa. He has published over 250 articles in the general area of earthquake engineering and seismic risk assessment and has given over 100 presentations in 30 different countries.

Dr. DesRoches has served as Chair of the ASCE Seismic Effects Committee (2006-2010), Chair of the executive committee of the Technical Council on Lifeline Earthquake Engineering (2010), and Board of the Earthquake Engineering Research Institute (EERI. He is currently a member of the executive committee of the National Academy of Sciences Roundtable on Risk, Resilience, and Extreme Events, and is on the advisory board for the Natural Disasters, Coastal Infrastructure and Emergency Management Research Center (DIEM). Dr. DesRoches has received numerous awards, including the Presidential Early Career Award for Scientists and Engineers (PECASE) in 2002. The PECASE award is the highest honor bestowed upon scientists and engineers in the early stages of their careers. Most recently, he was a recipient of the 2007 ASCE Walter L. Huber Civil Engineering Research Prize, the Georgia Tech Outstanding Doctoral Thesis Advisor Award (2010), and the Georgia Tech ANAK Award (2008). The ANAK award is considered the highest honor the undergraduate student body can bestow on a Georgia Tech faculty.

Dr. DesRoches earned his Bachelor's of Science in Mechanical Engineering, Master's of Science in Civil Engineering, and PhD in Structural Engineering – all at the University of California, Berkeley.

Reginald DesRoches, PhD, PE

Karen and John Huff School Chair and Professor

Civil and Environmental Engineering

GEORGIA INSTITUTE OF TECHNOLOGY

Georgia Tech School of Civil and Environmental Engineering
College of Engineering

Education

- **PhD, Structural Engineering, *UNIVERSITY OF CALIFORNIA - BERKELEY***
- **MS, Civil Engineering, *UNIVERSITY OF CALIFORNIA - BERKELEY***
- **BS, Mechanical Engineering, *UNIVERSITY OF CALIFORNIA - BERKELEY***

Research Interests

- **Critical infrastructure under earthquake engineering**
- **Seismic risk assessment of lifeline systems**
- **Application of innovative materials to structure rehabilitation**

Selected Service and Awards

- **Member, executive committee of the National Academy of Sciences Disaster Roundtable**
- **Member, Board for the Earthquake Engineering Research Institute**
- **NSF Career award (2001) and Presidential Early Career Award for Scientists and Engineers (2002), ASCE Walter L. Huber Civil Engineering Research Prize.**