Stony Brook University

Department of Civil Engineering

FALL 2021 SEMINAR SERIES

Dr. Pedro F. Silva

Professor
Department of Civil and Environmental Engineering, George Washington University

Monday, September 13, 1:00 – 1:55 PM, Frey Hall 309

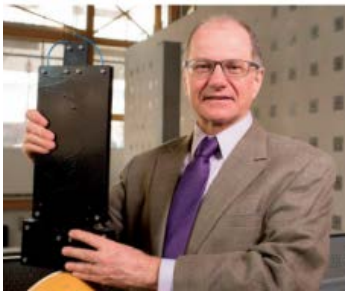
ZOOM LINK: Meeting ID: 950 8981 9867; Passcode: 860265
https://stonybrook.zoom.us/j/95089819867?pwd=NzdKQUJXU3J3NFN4VlpBUlp4bDFhUT09

Lateral Load Response of Self-Centering Pendulum Shear Walls

Abstract

The research discussed in this seminar addresses a grand challenge in structural engineering, which is the development of structural systems for use in resisting extreme hazards with minimum or no damage. Addressing this challenge will result in the design of the built infrastructure and in specific buildings that meet performance metrics towards achieving immediate occupancy and minimum economic losses following an extreme event, such as earthquakes. This research investigates a transformative structural wall system for buildings that performs damage free when resisting lateral loads. In this system, the shear wall footing interface consists of a curved surface. This profile allows the wall to slide along the bottom-curved surface without separation from the foundation, and lateral deformations are accommodated through a pendulum-type motion. According to this system, lateral resistance is achieved by a combined friction mechanism along the curved surface and the vertical prestressing cables. The post-tensioning cables also assist in restoring the system to its initial configuration. The result is a technology related to the design of damage-free structural systems, and a new way of thinking about leveraging system geometry and deformations for enhanced resilient and sustainable design of buildings. This research will promote new design concepts that harness deformations for optimal performance rather than performance objectives set to target material limit states. In this seminar, research outcomes are discussed that set towards a new design philosophy envisioned to be unrestricted by traditional material failure limit states.

About the Speaker:



Dr. Pedro Silva is a Professor in the Department of Civil and Environmental Engineering at the George Washington University. His main research interests are the development of innovative procedures for the design of civil structures to resist man made as well as natural hazards. Dr. Silva has over 25 years of experience in the design and experimentation of large-scale projects targeted at investigating new/retrofit design concepts for bridge and building structures. Dr. Silva is a voting member of the ACI Committees 440, where he developed specification language for the ACI 440-2 Chapter on Seismic Strengthening. Currently, this is the first code of practice worldwide for the design of Seismic Strengthening of Concrete Buildings Using FRP Composites. Recently, Dr. Silva research group completed the development of numerical tools for practitioners and researchers to use in the assessment/design of reinforced concrete (RC) slender bridge columns using new state of the art seismic design practice. Products of this research include numerical procedures used in defining stability indexes that: (1) stipulate threshold limits for neglecting P-Δ effects, and (2) define a collapse-prevention criterion.