## Speaker:

***Professor Roberto Leon***
Georgia Institute of Technology

## Session:

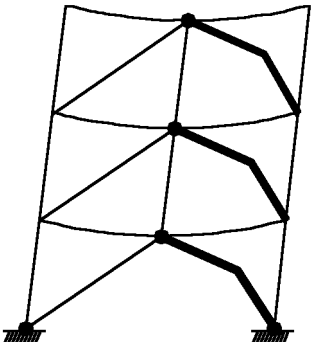
*On the Unique Nature of Collaboration*
8:30–10:30am

## Presentation title:

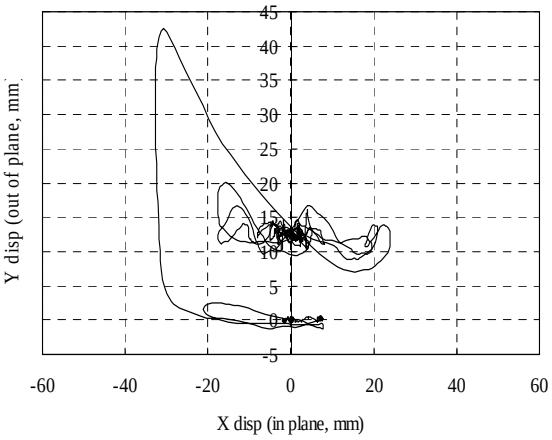
*Collaboration Lessons Learned from "Zipper Frame" Project at Buffalo, UB, GT, UC, UCB, and FAMU*

## Major points/topics:

- Great cooperation between all sites; particularly good interaction between graduate students
- Initial analytical studies led to extensive discussion on modeling approaches
- Initial tests provided surprising results and highlighted 2D modeling shortcomings.
- Difficulty in adhering to initial objective of similar loading between shake table, pseudo-dynamic and quasi-static tests
- Need for IT communications tools – most collaborative tool available limited to 4 sites.
- Limited capabilities of communication with remote viewers during testing.
- Improvement in IT tools will soon address many of these issues



Zipper frame showing simultaneous buckling of all floors




Horizontal displacement of one brace.

## Abstract/Summary

In this presentation, the initial collaborative experiences with an early NEES project will be described and some early technical results reported. The vehicle used for the collaboration is the development of design provisions and analytical tools for zipper frames. Zipper frames are intended to improve on the behavior of conventional inverted-V-braced frames, which exhibit poor performance arising from the early buckling of the lower story braces. A zipper frame provides better performance by forcing simultaneous buckling of all braces. The collaborative nature of the project arises from the need to test prototype and small scale model structures under both quasi-static and dynamic loading, and by the need to supplement such tests with much more economical subassemblage ones. So far the first shake table test at the University of Buffalo has been carried out. From the preliminary experimental results, the first- and second-story braces buckled and yielded but not as expected from the OpenSEES simulations. The structure showed a good spread of yielding and buckling, resulting in different behavior from the concentration of damage that appears in special concentrically braced frames. However, it is still not clear how to interpret some of the brace data obtained after entering the non-linear range. The reversed cycle loading tests at Georgia Tech, Colorado and Berkeley will try to verify the load path and sequence of member failure in the inelastic range.