

# OpenSees

## Open System for Earthquake Engineering Simulation

PEER NEES NEESit

- HOME
- USER
- DEVELOPER
- PROJECTS
- SUPPORT
- SITE MAP

- About
- News
- Calendar
- Registration

### Objectives

- Develop robust, high-fidelity simulation for PBEE
- Develop open-source software framework for simulation
- Incorporate high-performance computing, databases and visualization tools in simulation
- Educate engineering students in advanced computing and simulation
- Support NSF and NEES's goals for developing the National CyberInfrastructure

### Community Outreach

- OpenSees Days: annual user & developer workshops
- OpenSees message board<sup>1</sup> (number of members: 5000, number of posts: 4674)
- OpenSees web site<sup>2</sup> (number of registered users: 7000, number of downloads: 7500)
- Extensive documentation (Command language & examples manuals)

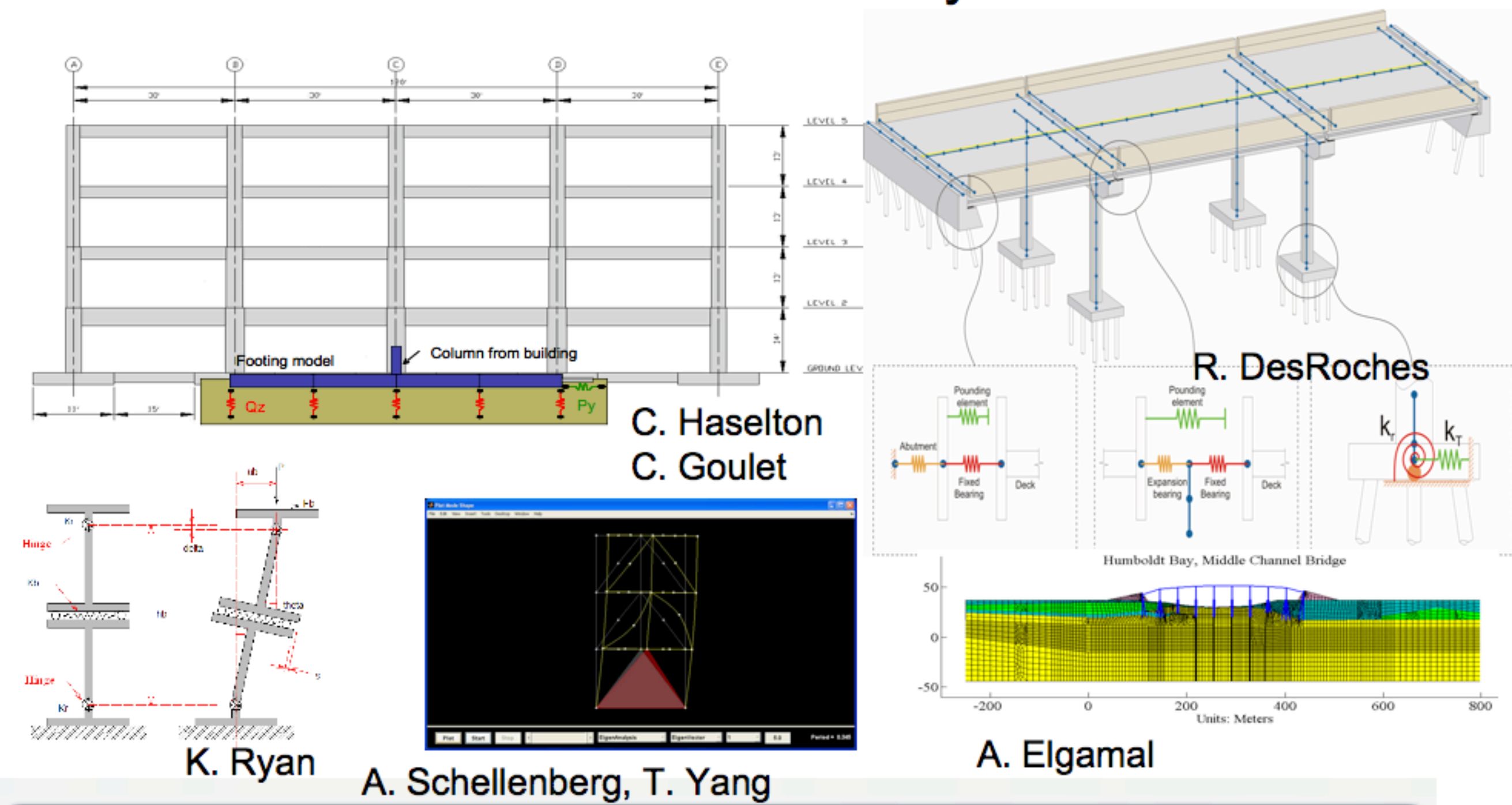
<sup>1</sup>Since June 2004    <sup>2</sup>Since March 2005



### Accomplishments

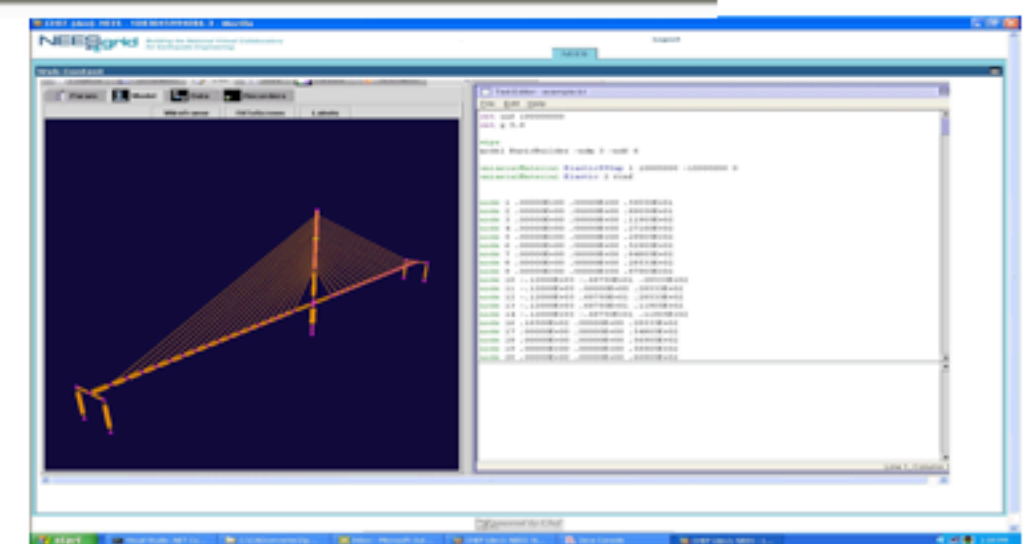
Enabling technology for high-fidelity simulation:

- Performance-based earthquake engineering
- Soil-foundation-structure interaction
- Advanced material and element models
- Use IT and contribute to NEES CyberInfrastructure



### NEESit Interaction

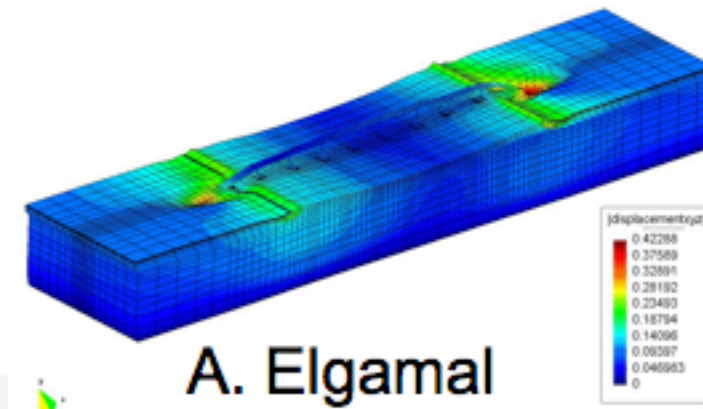
- High-performance computing on supercomputers and clusters
- Hybrid simulation
- Simulation portal, interfaces with NEEScentral (data), workflow integration



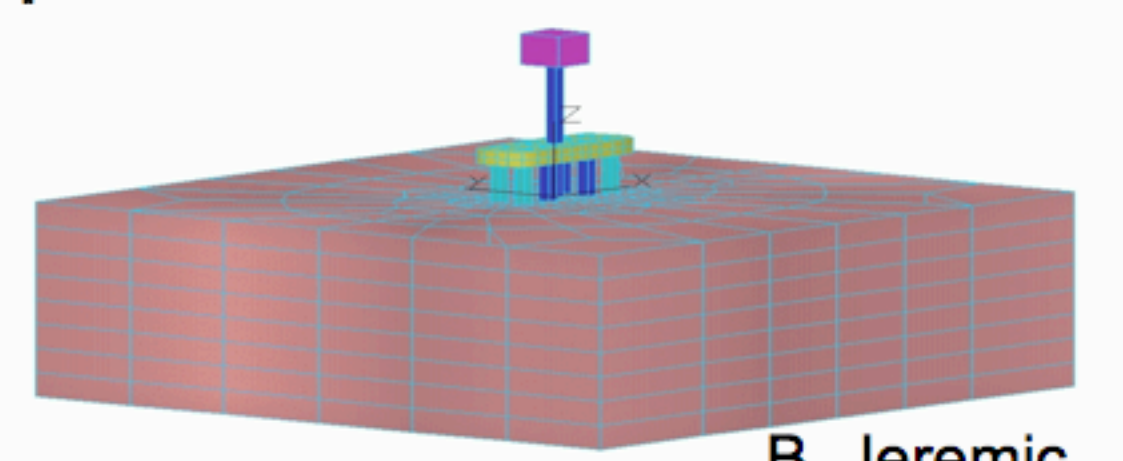
T. Haupt

### SFSI

- Soil layering effects
- Pile group effects
- Soil liquefaction and impact on structural performance
- Effects of soil liquefaction on piles
- Large scale SFSI interaction



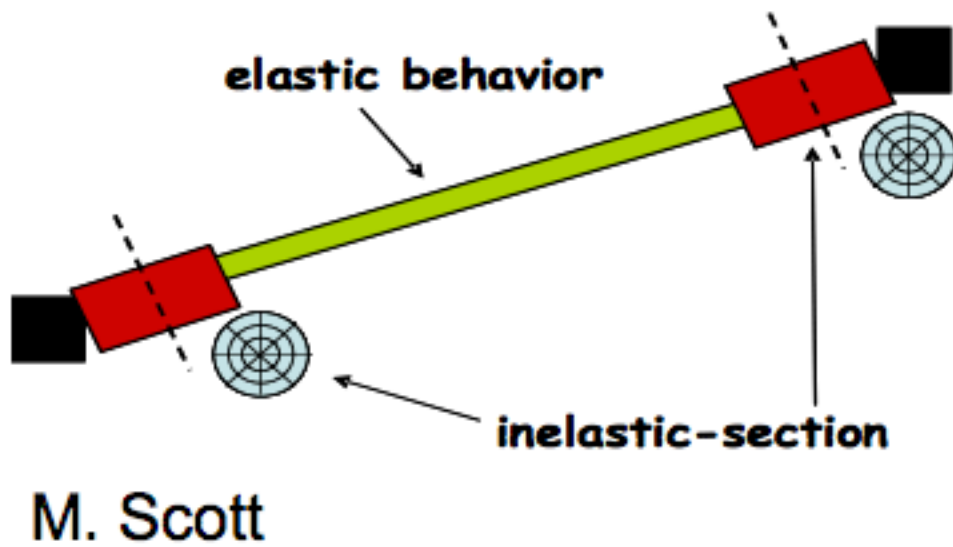
A. Elgamal



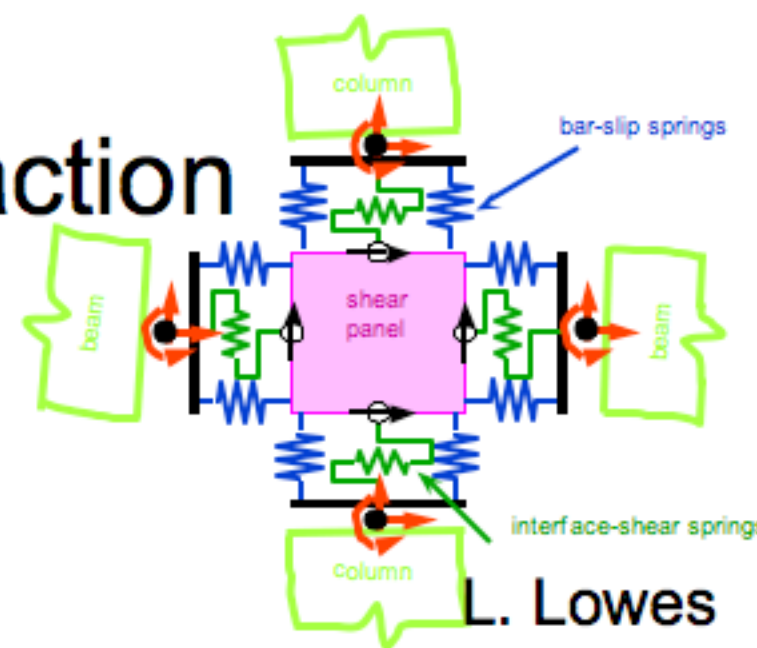
B. Jeremic

### New & Improved Models

- New material models for concrete
- Advanced modeling for beam-columns, including shear interaction
- Models for non-ductile behavior of joints
- Full suite of soil models, including liquefaction



M. Scott

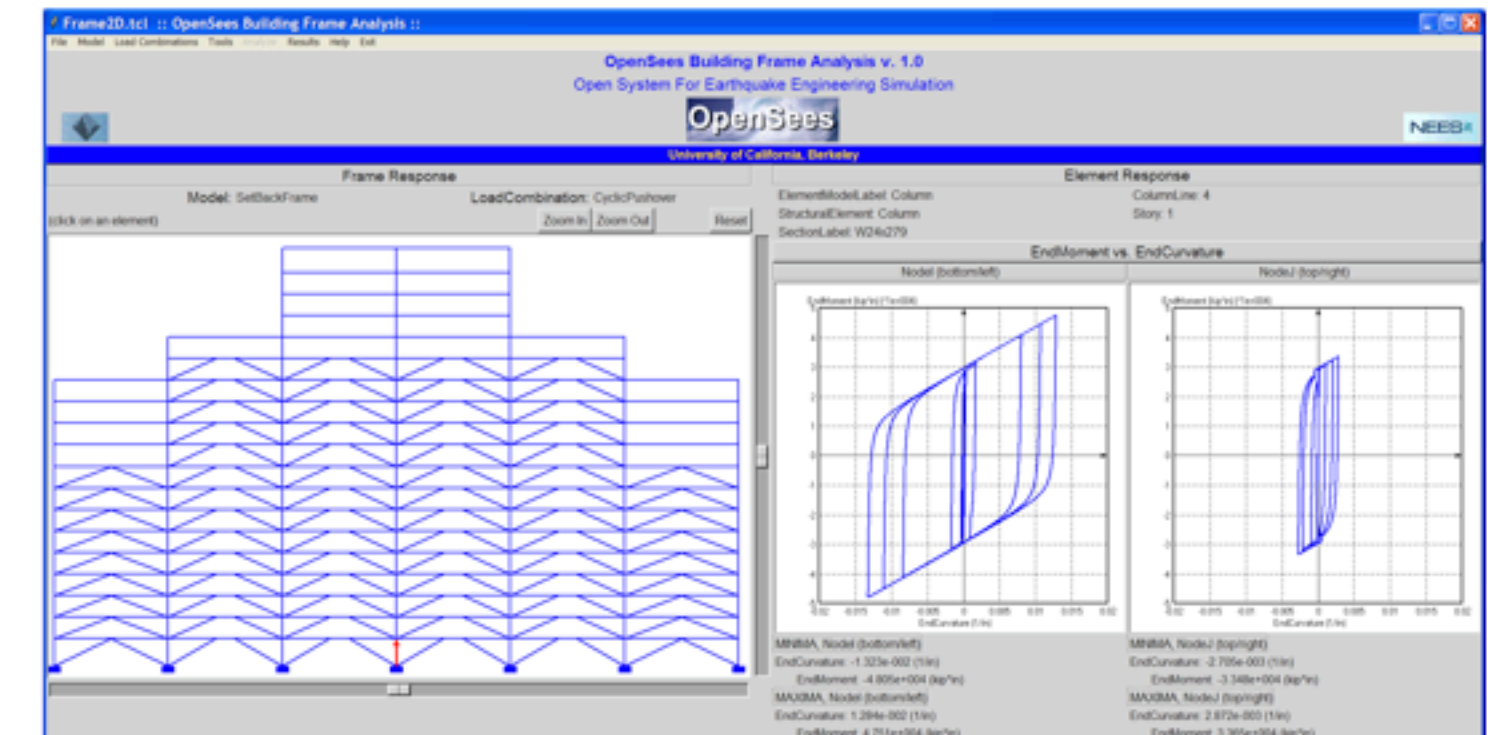
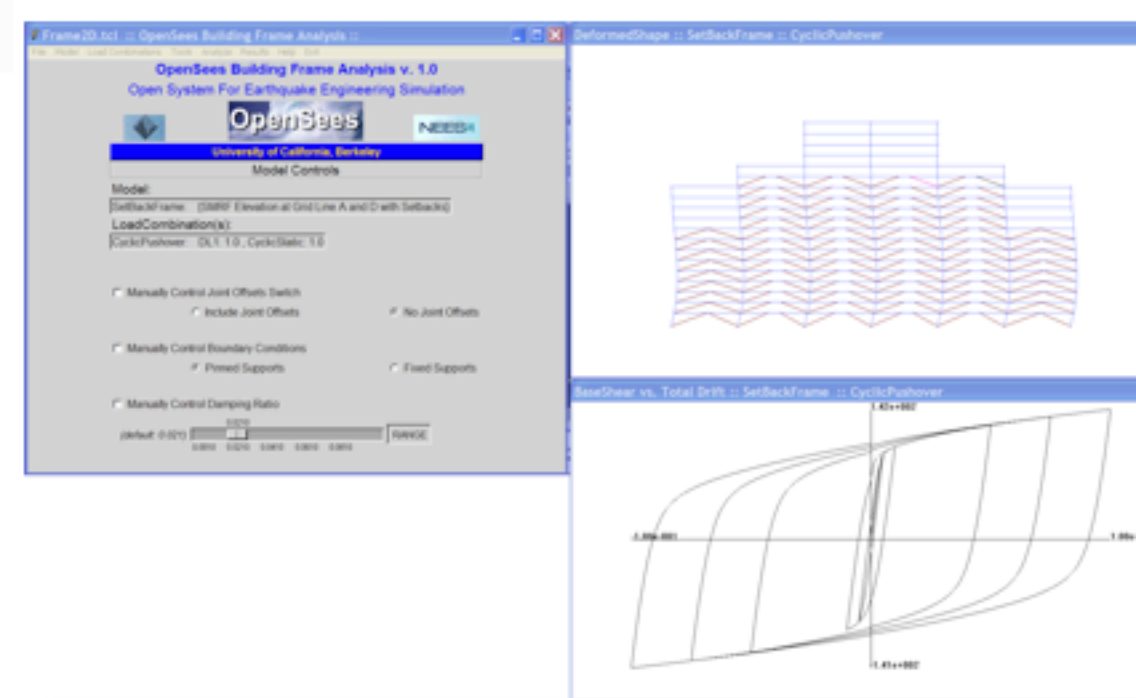


L. Lowes

P. Arduino

### Tools for Practicing Engineers

- High-level scripting and visualization tools for building-frame analysis



S. Mazzoni

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