

Workshop Agenda Overview

Workshop Goals

- Coordinate 2013 GMSV TAG projects with 2012 counterparts and other related SCEC projects (see below)
- Discuss a plan for future GMSV TAG projects

Workshop Sessions

<i>08:15 - 09:45</i>	2012 GMSV TAG Projects
<i>10:00 - 11:00</i>	Broadband Platform (BBP) Validation Project
<i>11:00 - 12:10</i>	SEISM Project
<i>01:00 - 01:45</i>	2013 GMSV TAG Projects
<i>01:45 - 03:00</i>	Future GMSV TAG Efforts (incl. UGMS)

SCEC Ground Motion Simulation Validation (GMSV) Technical Activity Group (TAG) Coordination Workshop

Session 1: 2012 GMSV TAG Projects

Independently proposed by individual PIs in response to general GMSV priorities in SCEC Collaboration Plan, but coordinated via April '12 workshop

- Validation of elastic spectral correlations and inelastic spectra from ground motion simulations (J. Baker, Stanford)
- Validation of broadband ground-motion synthetics using earthquake engineering-relevant metrics (K. Olsen, SDSU)
- US-Japan collaboration on strong ground motion prediction techniques (P. Somerville et al, URS)
- Behavior of multiple broadband ground motion simulation techniques for a suite of earthquake scenarios using multiple rupture model generators on the SCEC Broadband Platform (J. Bayless et al, URS)
- Precariously Balanced Rock (PBR) science for SCEC 4: Validation of ground motion prediction and simulations (G. Biasi, UNR)
- A framework for validation of ground motion simulations emphasizing predictive power [& effective stress analyses] (B. Bradley, Canterbury)

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Aside: 2012 “Companion Projects”

Conducted by SCEC researchers in coordination with, but not as, GMSV TAG projects. Presented at 2012 SCEC Annual Meeting (GMSV Workshop).

- Engineering Perspective on Simulation Validation & Use of Broadband Platform – J. Baker & L. Burks
- Validation of Broadband Platform Simulations for Historical Events – F. Zareian & S. Rezaeian
- Comparison of CyberShake Hazard Models with NGA Models using Averaging-Based Factorization – F. Wang & T. Jordan

Session 2: BBP Validation Project

- *Initiated by Norm Abrahamson at 2012 GMSV TAG Coordination Meeting*
- *Discussed at 2012 SCEC Annual Meeting (GMSV Workshop) ...*

Agenda

13:00-13:05	Welcome and Background of GMSV Technical Activity Group and Broadband Platform Validation Project	<i>T. Jordan</i>
13:05-13:10	Overview of Agenda (pdf) SCEC Broadband Platform Validation Project Moderator: <i>Phil Maechling</i>	<i>T. Jordan</i>
13:10-13:15	Session Introduction	<i>P. Maechling</i>
13:15-13:30	Motivation and Needs (pdf)	<i>N. Abrahamson</i>
13:30-13:45	Validation Plans (pdf)	<i>C. Goulet</i>
13:45-14:00	Simulation Plans (pdf)	<i>P. Somerville</i>
14:00-14:30	Discussion	<i>All</i>

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Session 3: SEISM Project

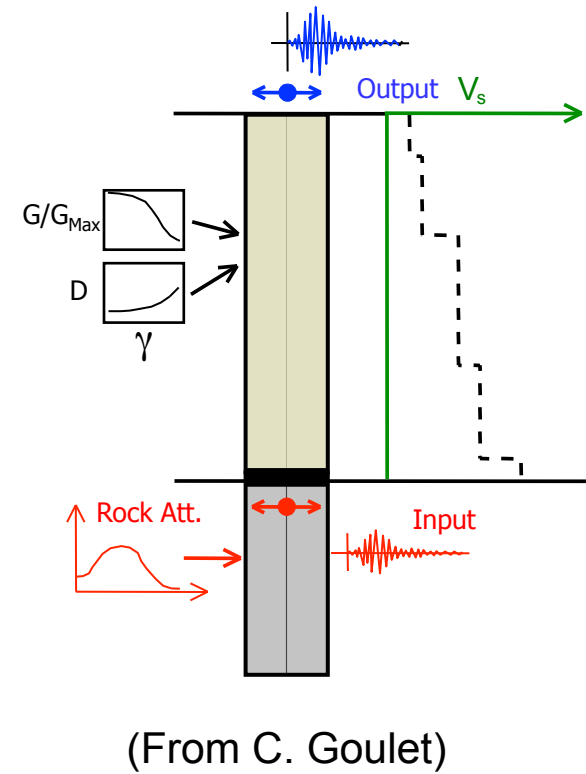
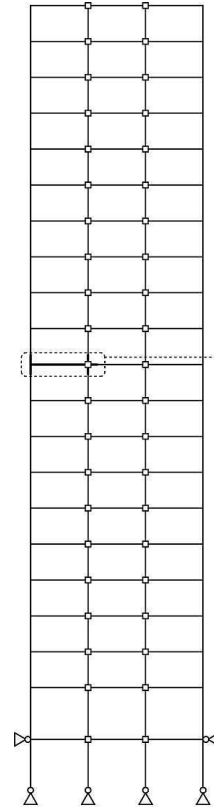
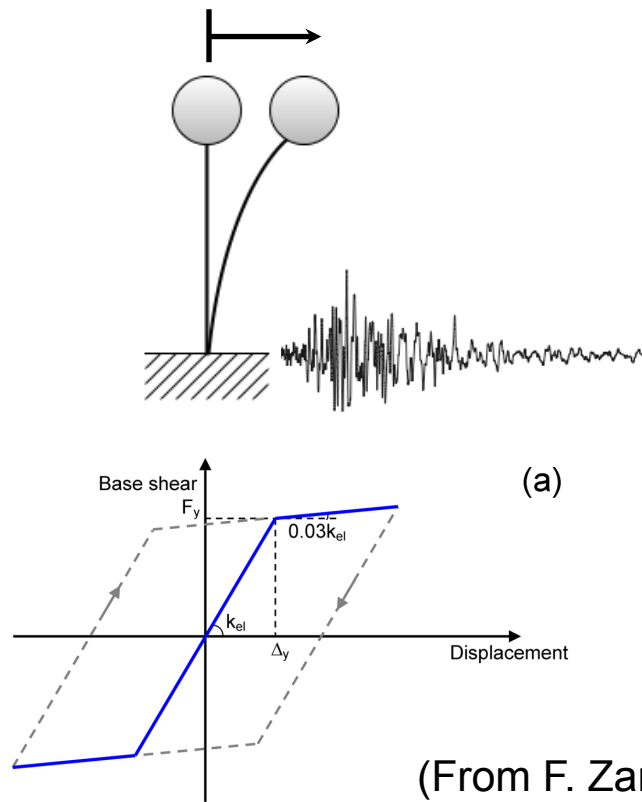
SEISM hazard products will have to survive a more rigorous validation process. A key objective of this project is to establish a comprehensive validation framework that conforms to end-user requirements. The earthquake engineers participating in this proposal—co-PI Bielak, and Baker, Iervolino, Luco, Stewart, Zareian—are members of the SCEC Ground Motion Simulation Validation (GMSV) working group (chaired by Luco). They convened a workshop in January 2011 and recommended a three-step validation framework:

1. **GMSV using single-degree-of-freedom (SDoF) oscillators.** The response spectra for elastic and inelastic SDoF oscillators are known to approximate the seismic response of nonlinear buildings and geotechnical structures with many degrees of freedom [59, 60]. The first step is to compute and compare response spectra (elastic and inelastic) from ground motions recorded during the past earthquakes (Table 1) with those simulated for the same recording stations over a broad range of spectral frequencies (0.1 to 10 Hz). Baker will lead the implementation of this process.
2. **GMSV for geotechnical systems.** The second step is to quantify the limitation of representing nonlinear geotechnical systems by elastic and inelastic SDoF response spectra. This requires comparison of the Step-1 results with the responses of selected geotechnical systems to simulated and observed ground motions. Calculations of nonlinear site response and slope displacement analysis should be used to isolate any differences between simulations and observations that are not properly represented by the elastic and inelastic response spectra. In particular, some geotechnical systems are particularly sensitive to strong motion duration [61]. Stewart will lead the implementation.
3. **GMSV for multi-degree-of-freedom (MDoF) nonlinear building systems.** The third step is to compare simulation-vs.-observed differences derived from elastic and inelastic response spectra with the response differences computed for more realistic MDoF models of nonlinear building systems. This comparison will be based on inter-story drift spectra and energy metrics of building response, which have been effectively applied in assessing stochastic ground motion simulations [62, 63]. Initial calculations should target selected reinforced concrete frame buildings with emphasis on stiffness and strength degradation. Iervolino, supported by REAKT (see Gasparini letter) will lead the implementation.

To facilitate the application of these validation procedures to suites of SEISM simulations, we will develop an API that will automate use of the OpenSees framework to calculate elastic and inelastic SDoF response spectra; Zareian will lead this development. This **SEISM-OpenSees interface** will set the stage for GMSV procedures that utilize more realistic MDoF nonlinear systems.

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Session 3: SEISM Validation “Gauntlet”



OpenSees				PEER	NEES	NEEScomm	
HOME	USER	DEVELOPER	PROJECTS	SUPPORT	PARALLEL	COPYRIGHT	SITEMAP

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Session 4: 2013 GMSV TAG Projects

Like 2012 SCEC GMSV TAG Projects, independently proposed by individual PIs in response to general GMSV priorities in SCEC Collaboration Plan.

- Validating nonlinear site response prediction methodologies for SCEC broadband ground motion simulations (D. Asimaki, Georgia Tech)
- Simulation and validation of long-period earthquake ground motion in the Kanto Basin in Japan (J. Bielak, CMU)
- 3 others on hold, pending more funding from NSF/USGS

Session 5: Future GMSV TAG Efforts

- Support of Committee for Utilization of Ground Motion Simulation (UGMS)?
- Report on simulated ground motions for building code response history analysis?
- Discussion (60 minutes)

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