

Upcoming Workshop:

Use of SCEC Seismogram Simulations for Building Response Analysis

Southern California Earthquake Center (SCEC) Utilization of Ground Motion Simulations (UGMS) Committee Meeting

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SCEC Seismogram Simulations

- “CyberShake” (used by UGMS Committee)
- “Broadband Platform” (focus of upcoming workshop)

Current Differences	CyberShake	Broadband Platform
Purpose	PSHA	Scenarios
Methods	Graves & Pitarka	Several (7)
Basin effects	3-dimensional	1-dimensional
Frequency band	< ~1 Hz	0-100 Hz
Computer needed	Supercomputer	Personal computer
Validations	Relatively limited	Relatively extensive

Ground Motion Simulation Validation

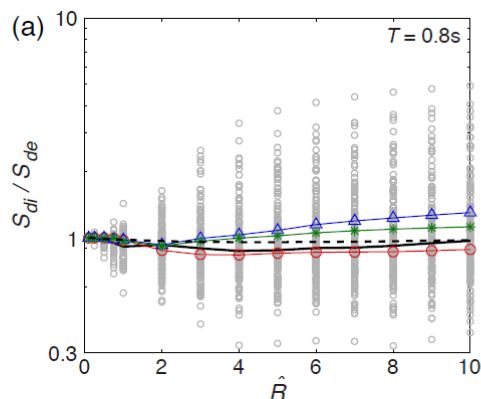
- Of simulation methods (e.g. Graves & Pitarka), not individual seismograms
- With respect to ...
 - a) recorded data from past earthquakes (e.g. 1994 Northridge)
 - b) empirical ground motion models (e.g. NGA-West2)
- Validated simulated methods useful for producing **not-yet-recorded** and/or **site/region-specific** (e.g. repeat of 1906 S.F.) seismograms

Ground Motion Simulation Validation

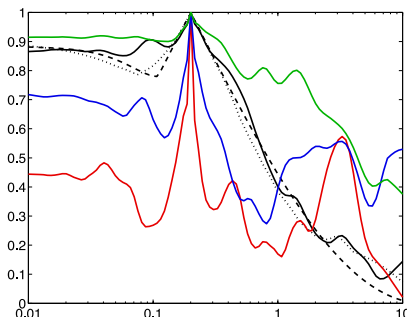
- Validation approach depends on how simulations will be used, e.g. ...
 - 1) Development of Spectral Response Acceleration (SRA) Ground Motion Models
 - 2) Development of SRA Hazard Maps
 - 3) Building Code (*ASCE 7-16*) Nonlinear [Building] Response History Procedure
- For building response analysis applications, validations typically make use of simple ground motion parameters that serve as proxies for building response, e.g. ...

Example Validation Parameters

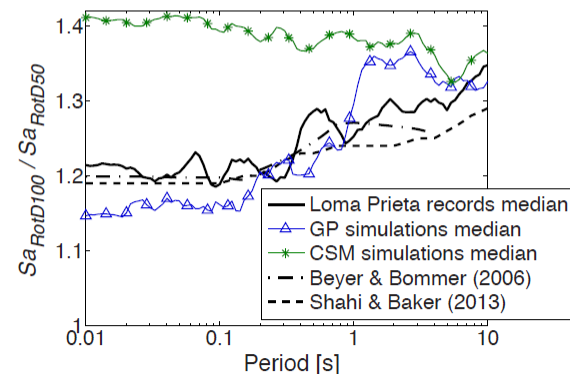
Inelastic Spectral Displacement Elastic Spectral Displacement



Correlation of S_a 's



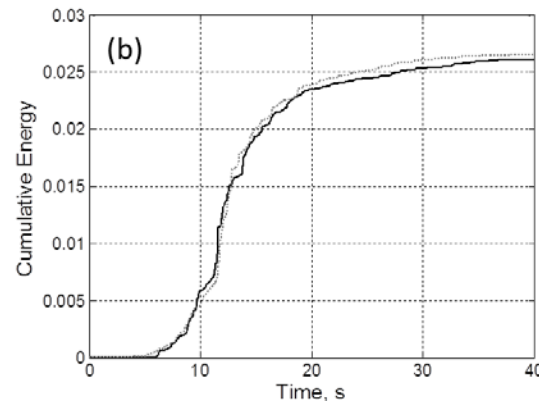
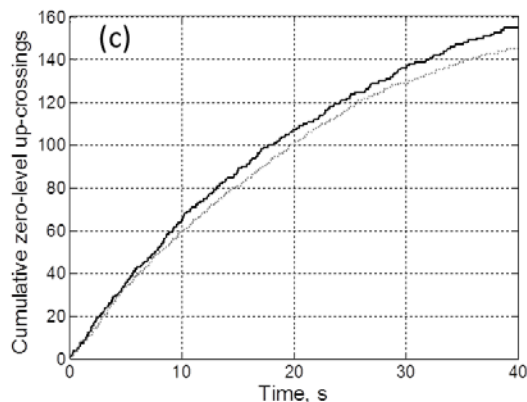
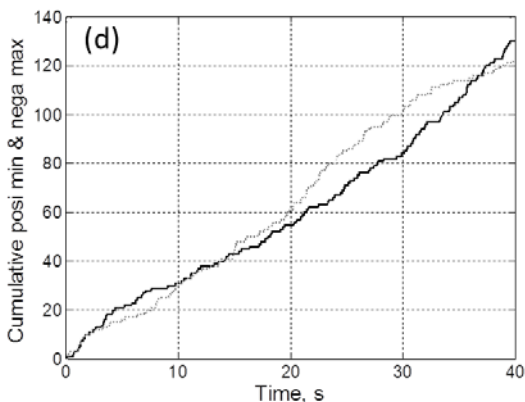
Maximum Horizontal Spectral Acceleration Median Spectral Acceleration



Evolution of Frequency, Predominant Frequency, & Rate of Change of Frequency with Time

Evolution of Intensity, Arias Intensity, Significant Duration, & Arias Intensity / Significant Duration

Evolution of Bandwidth



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GMSV Workshop Info

- **Why:** Demonstrate validation and use of simulated seismograms for building response analysis
- **Who:** Building response analysts (engineers),
Ground motion seismogram simulators,
Organizers – limited to ~30 in-person invitees
- **When:** TBD in February-March, 2018
- **Where:** USC

Draft Workshop Agenda

- Intro to Broadband Platform (BBP) simulations
- Intro to CyberShake simulations
- Intro to Ground Motion Simulation Validation (GMSV)
- Demo of use of simulations for *ASCE 7-16* Nonlinear Response History Procedure
- Demo of use of simulations for *FEMA P-58* Collapse Fragility Analysis
- Access to validated BBP simulations for building response analysis