

GMSV for Multi-Degree-of-Freedom (MDoF) Nonlinear Building Systems

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

Nicolas Luco for ...

Iunio Iervolino

Universita degli Studi di Napoli Federico II

SEISM Proposal

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.

Tentative Plans

- Generic and steel buildings used in previous research with C. Galasso & F. Zareian, instead of reinforced concrete buildings
- Energy metrics of building response in addition to story drifts and floor accelerations
- Differences between building responses to simulated vs. observed ground motions *with similar response spectra*
- Also interested in working on spatial correlation of elastic spectral accelerations
- Previous work on an inelastic SDoF response (displacement & hysteric energy) GMPE can be utilized