GMSV in SEISM Project

Jonathan P. Stewart

University of California, Los Angeles

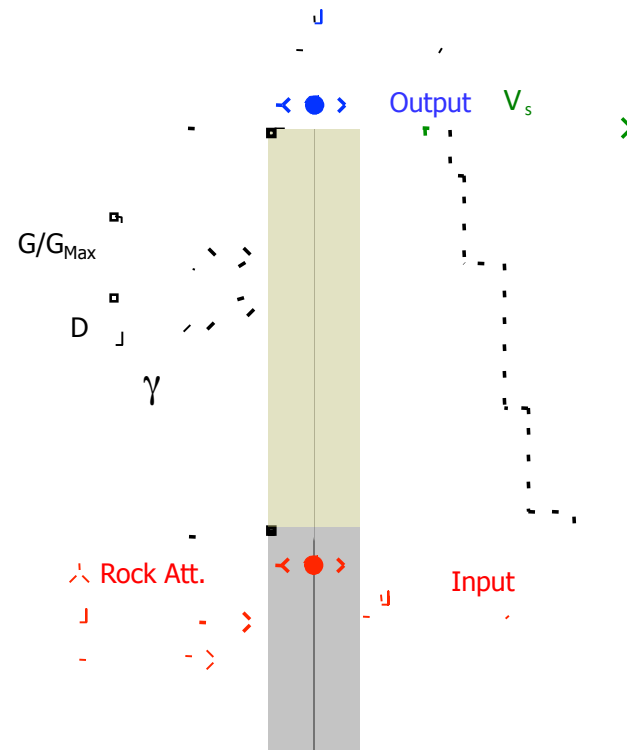# Outline

Possible areas of activity:

- Geotechnical validation – *duration sensitive*
  - Not at top of list in validation gauntlet
- General validation / use of simulations
  - Fundamental to the validation gauntlet

Geotechnical Validation
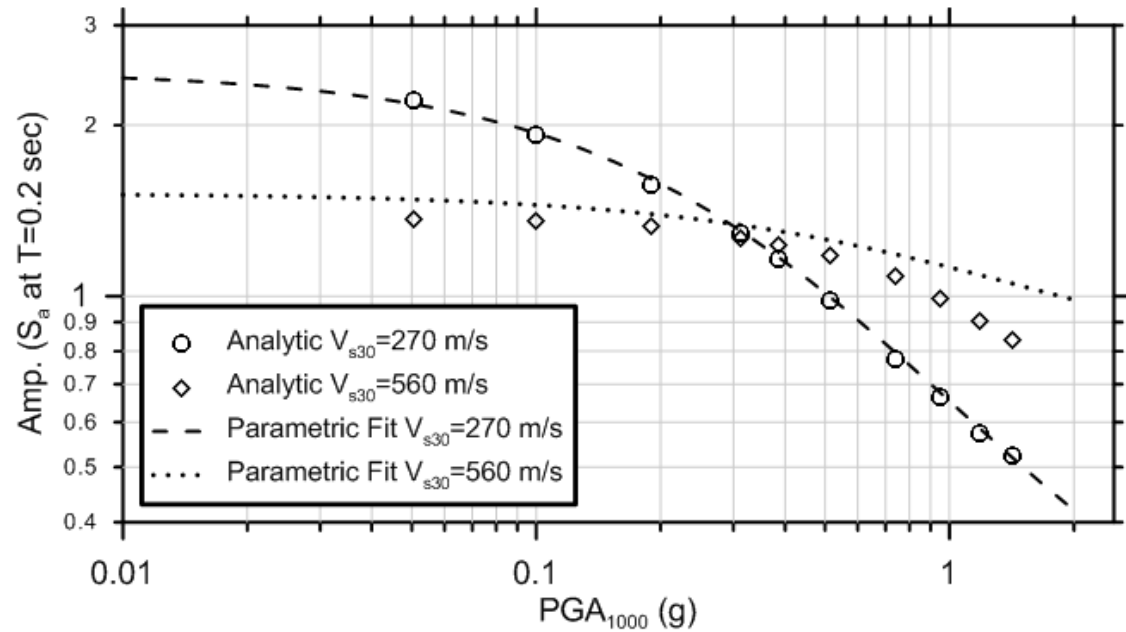
- ## Site response

  Equivalent-linear

  Nonlinear

Output V_s

G/G_{Max}

D

γ

Rock Att.

Input

Geotechnical Validation

- **Site response**

    Outcome:

Geotechnical Validation

- ## Site response

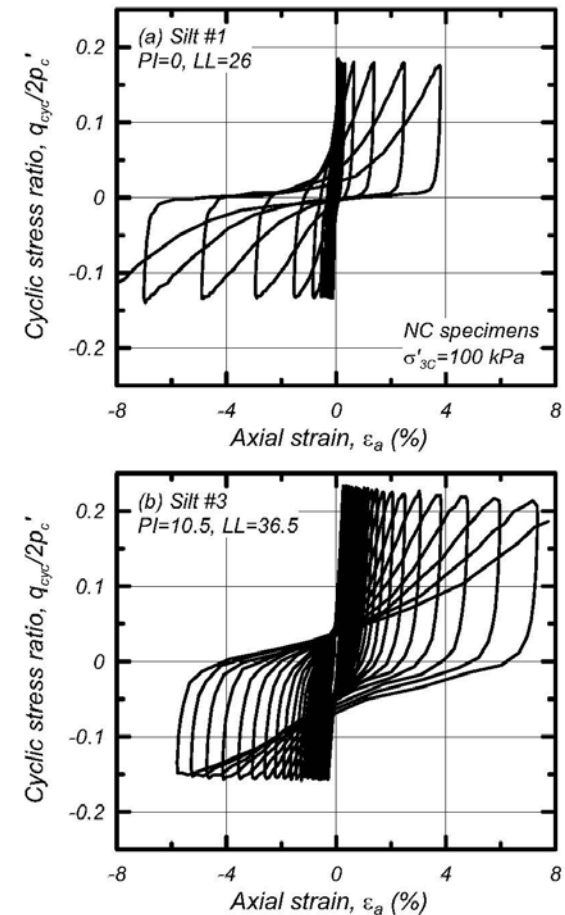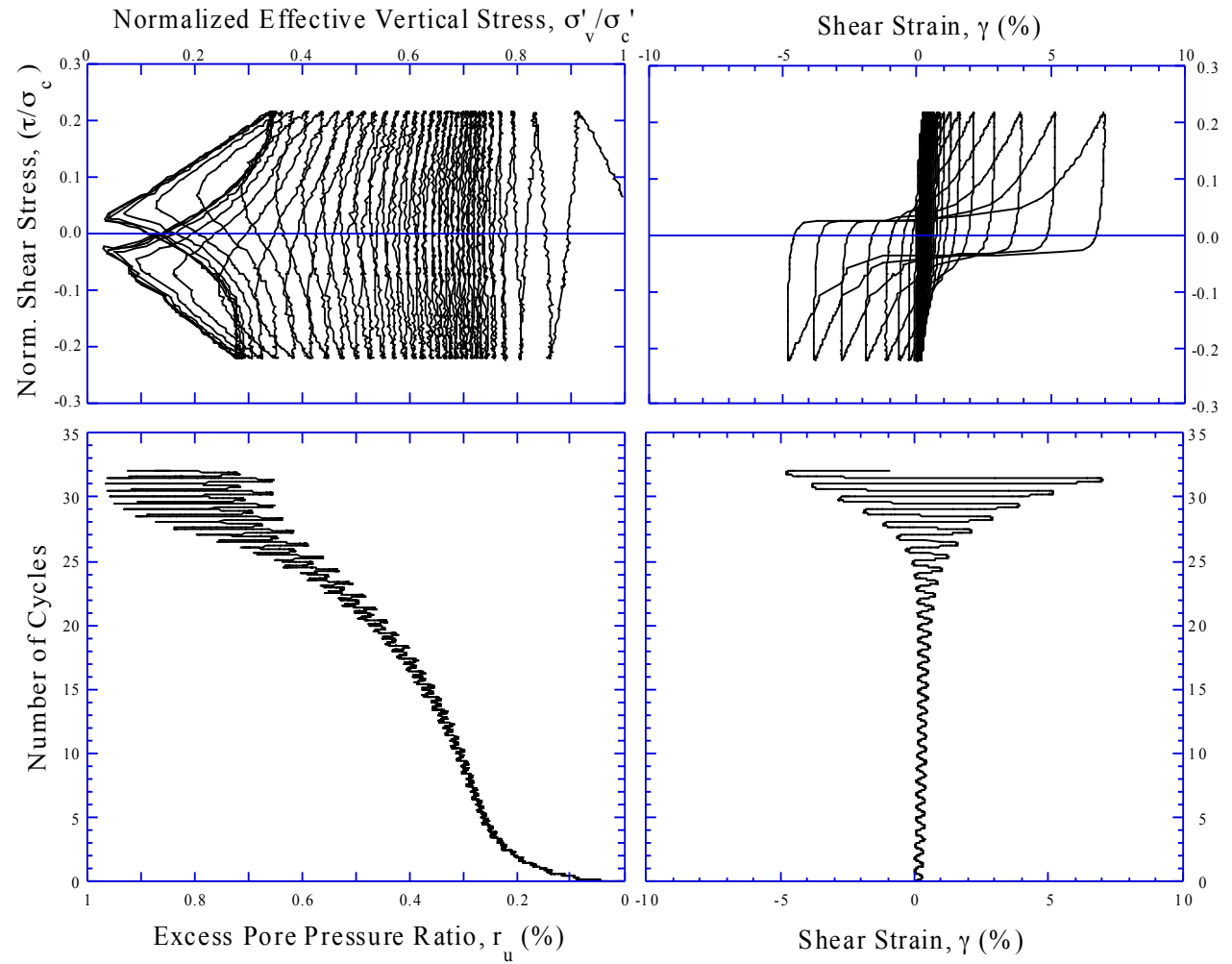- ## Nonlinear soil response

  Element response:

FIG. 2-15: Stress-strain response for normally consolidated specimens of two silt mixtures during undrained cyclic triaxial loading (after Romero 1995)

Boulanger and Idriss, 2004

Candidate metrics:

End of record pore pressure generation
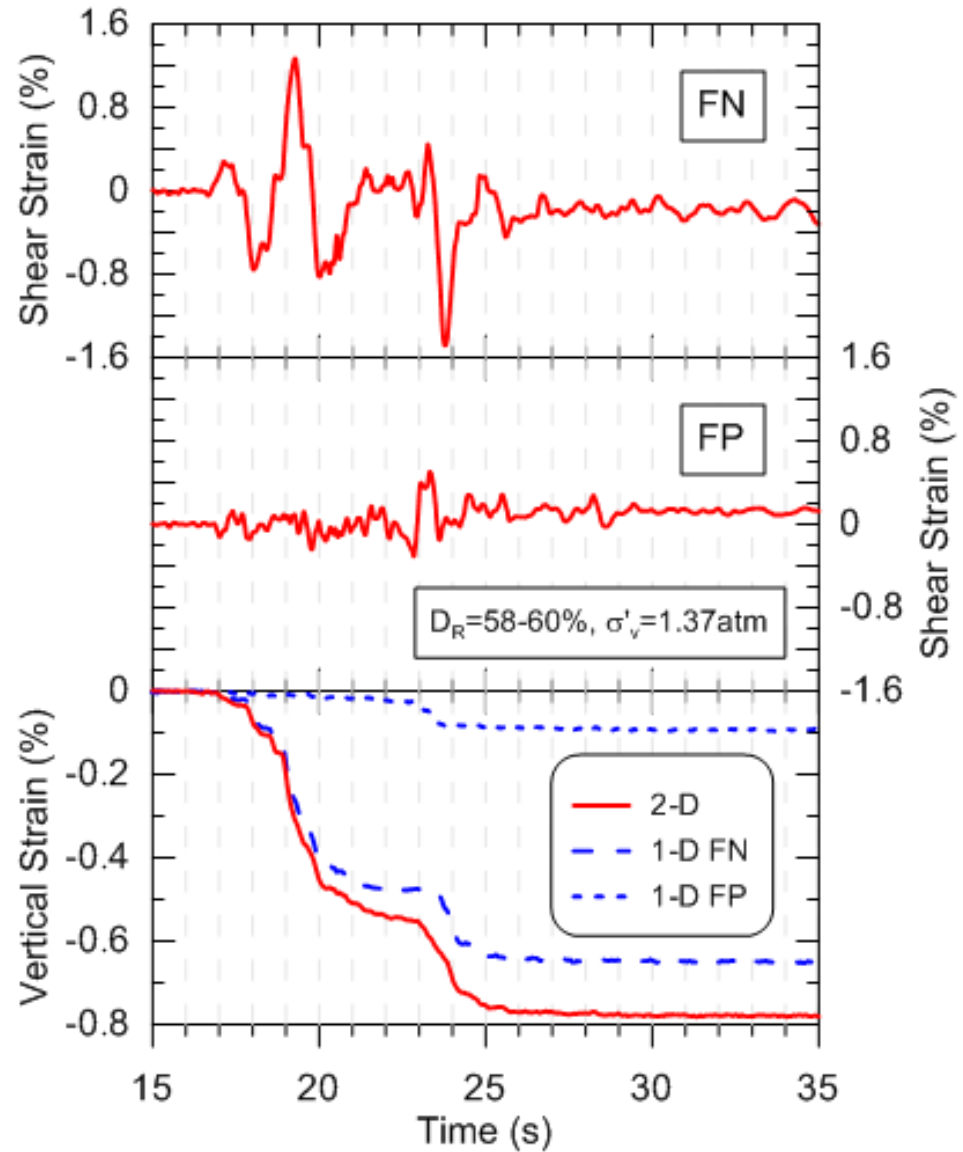
Peak shear strain

Kammerer et al. (2002)

Candidate metrics:

End of record pore pressure generation

Peak shear strain
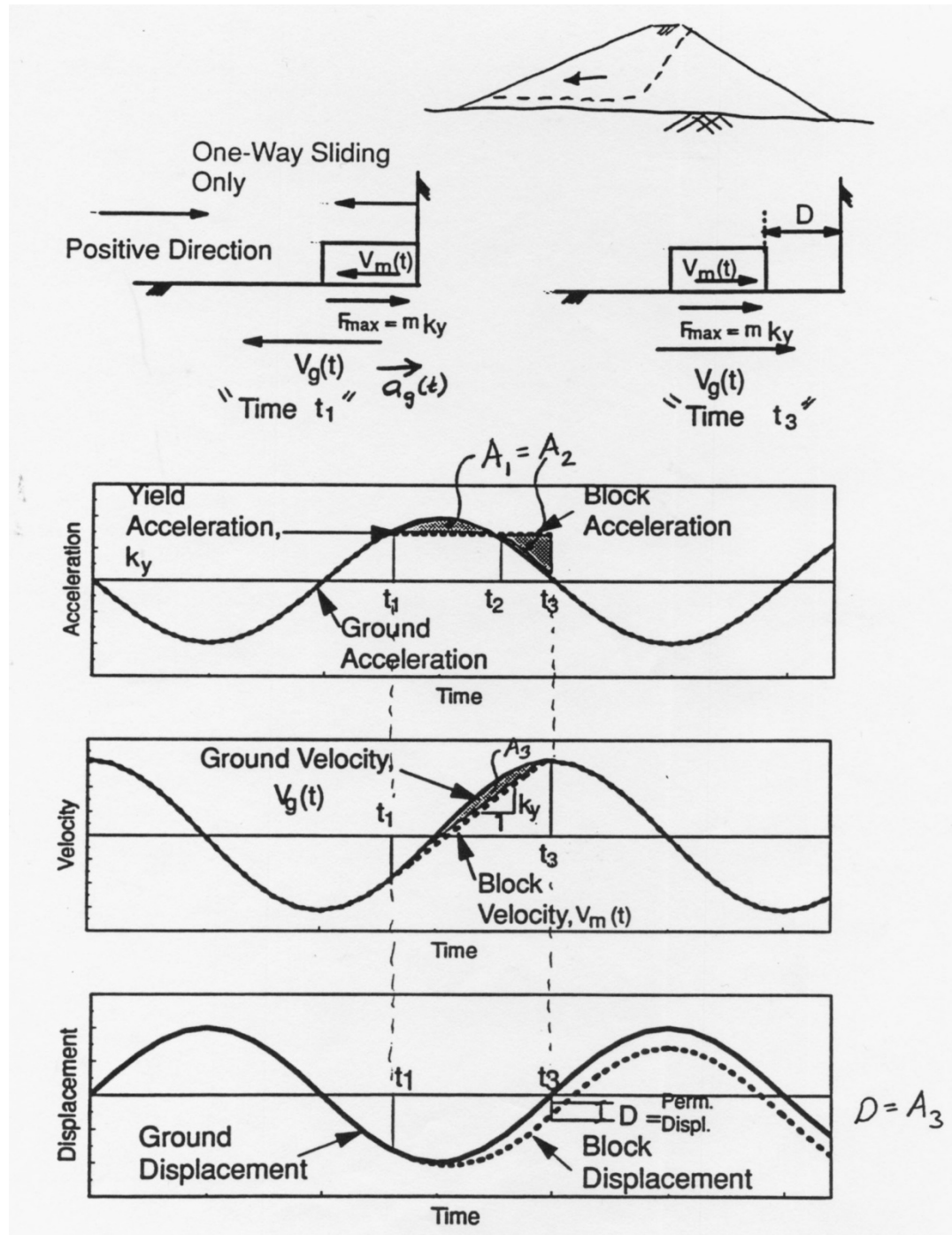
Post (or during) cyclic volume change

Yee et al. (2012).

Geotechnical Validation

- **Site response**
- **Nonlinear soil response**
- **Newmark displacements**

Newmark sliding block:

Geotechnical Validation

- Compute geotechnical engineering demand parameters (EDPs) of interest using recorded and simulated ground motion suites.

- OpenSees platform can be used

- Identify inconsistencies and their cause

General Validation / Use of Simulations

- Distance scaling; M-scaling

- Spectral shape

- Sigma from simulations (within- and between-event)

- Basin effects

- Useful for:

  - Simulation validation

  - Constraining components of GMPEs poorly constrained by data