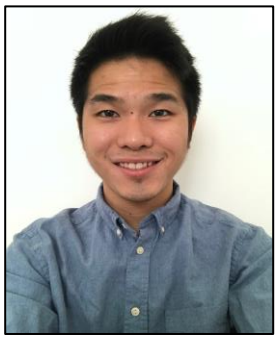
ShakeVT2: Program for Equivalent Linear Seismic Site Response Analysis



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Sponsors: NSF; CGPR

Start / Completion Dates: June 2018 / January 2019

Project Background

Seismic site response analyses are often required as part of the design of buildings within seismically active and potentially active regions. The objective of site response analysis is to determine the effect of the local site conditions on earthquake ground motions. The most common approach for conducting site response analyses is the equivalent linear method proposed by Schnabel et al. (1972). A computer program called SHAKE was released in accompaniment to the unveiling of the algorithm in order to run the equivalent linear site response analysis algorithm. Since then, earthquake geotechnical engineers have been able to conduct seismic site response assessment much more quickly with considerable accuracy.

Project Objectives

Since the release of SHAKE, many other site response analysis programs have been developed and released into the market with added functionalities. Although they have been proved reliable, certain functionalities and design aspect are still lacking. These include:

1. Outputs for liquefaction assessments
2. Batch mode analysis (multiple soil profile, multiple input ground motions)
3. Simple user interface and user experience

This project aims to address all the issues stated above in attempt to create a more functional site response analysis software. Project objectives are achieved through the development of a computer program equipped with a graphical user interface supported by a Python-based equivalent linear site response analysis algorithm on the back-end.

Research Plan and Progress

A list of research tasks and key findings is provided below:

1. Build a python-based equivalent linear site response analysis algorithm that includes output for liquefaction assessments: dissipated energy, stress reduction coefficient, and number of equivalent cycles.
2. Build a user interface compatible across all operating systems – Windows, MacOS, and Linux (currently Windows only).
3. Verify code against other site response analysis programs, e.g., Strata and DEEPSOIL.
4. Write a user manual.