

Analytical Study of the Spectral-Analysis-of-Surface-Waves (SASW)

Method at Complex Geotechnical Sites

Jeff Bertel

Dr. Brent Rosenblad, Thesis Supervisor

Abstract

The Spectral-Analysis-of-Surface-Waves (SASW) method is an accepted means of measuring shear wave velocity (V_S). In some settings, SASW measurements have produced results that were inconsistent with results from other methods of measurement. The effectiveness of the SASW methodology at complex geotechnical sites was investigated to identify site conditions where the SASW approach may produce erroneous results. Analytical simulations of surface wave measurements were performed. A traditional SASW methodology (global analysis), and a more rigorous approach (array analysis) were used to generate experimental dispersion curves. The effectiveness of these approaches was evaluated by comparing the experimental results to the true dispersion curve.

The global analysis yielded dispersion curves that tend to underestimate surface wave velocities at long wavelengths. The array approach worked well for both simple, gradually increasing V_S profiles as well as for some complex profiles with large V_S contrasts. In some cases both the global and array analysis produce an experimental dispersion curve that is not consistent with the theoretical dispersion curve, especially for soft-over-stiff profiles, a common profile encountered in the field. These results have implications for earthquake site response analysis.