Field measurement of change in S-wave velocity of the surficial soils under shaking by an S-wave vibrator.

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Nonlinear properties of near-surface soils under the strong motion can be evaluated in place by means of S-wave vibrator (Inazaki, 1997 Joint Meeting). The method utilizes a shear wave vibrator as a dynamic loading source to control strain state in the near-surface soils and a seismic cone array embedded in the near-surface to monitor the instantaneous response of the ground under shaking. The shear wave vibrator has a power to shake the ground with 100 gal or more at 5 m to the vibrator, however, the waves generated by the vibrator were unsuitable for response evaluation. So, we deployed impulsive SH-waves generated by hitting a plank set close to the seismic array. We have successfully observed decrease in S-wave velocity up to 40 % in the soft ground (Inazaki, 1998 2nd ESG). On the other hand, the repeated monitoring has also detected background S-wave velocity variation ranging a few %. This is probably due to precipitation, and indicates S-wave velocity in the near-surface is not so cinstant.

There are following three parameters to control strain state using S-wave vibrator; distance, power, and frequency. We examined these three parameters in the viewpoint of reproducibility and equivalency. As a result, power control was most convenient to accomplish wide ranging of strain state in the near-surface soils.