

Nonlinear behavior of soft soil deposits in wide area during the 2011 Tohoku earthquake

Atsushi Wakai^{1*}, Atsushi Nozu¹

¹Port and Airport Research Institute

In order to understand the effects of strong ground motions on engineering structures, it is important to evaluate the effects of soil nonlinearity on strong ground motions. In this report, based on strong motion records obtained in wide area during the 2011 off the Pacific coast of Tohoku earthquake, degree of soil nonlinearity was evaluated based on the shift of peak frequencies from linear site amplification factors to observed Fourier spectra during the Tohoku earthquake. Then, the relation between the degree of soil nonlinearity and ground motion indices such as PGA, PGV and PSI was investigated. It was found that the degree of soil nonlinearity was best correlated with PGV and the relation can be approximated with a hyperbolic curve. In addition, it was found that the deviation from this empirical formula is correlated with the peak frequencies of linear site amplification factors.

Keywords: nonlinearity, strong motion, the 2011 Tohoku earthquake, empirical equation