Geophysical exploration of deep sedimentary layers in the Kanto basin for estimation of strong ground motion

Hiroaki Yamanaka[1]; Nobuyuki Yamada[2]

[1] T.I.Tech; [2] Chuo Kaihatsu

Effects of subsurface structure of sedimentary layers over the basement with an S-wave velocity of 3 km/s must be included in estimation of strong ground motion at a site in a basin. In particular, we must estimate effects of whole of propagation path of long-period surface wave at periods from 1 to 10 s.

Geophysical explorations, such as seismic refraction surveys by Research Group on Underground Structure in the Tokyo Metropolitan Area, have been conducted in the Kanto basin to know structure of deep sediments. Recently, numbers of geophysical explorations for the deep basin are increasing in the area with efforts by universities, research agencies and local governments. Furthermore, private companies in consulting business of seismic design of buildings are also trying to know S-wave profiles of deep sediments at their own site using low-cost exploration methods based on microtremor array measurements.

We first summaries results of previous geophysical explorations of deep sedimentary layers in the Kanto basin including 3D models proposed and results of numerical simulations of long-period ground motion in the area. Then the advantage of the microtremor array exploration to construct a model of S-wave structure of the sediments for estimation of long-period ground motion is explained. We also show results of the microtremor array explorations and computations of long-period motion in the area. The observed long-period ground motion during a moderate event were well-reconstructed by the computation with the new 3D model of the basin. We finally suggest future developments and requirements in geophysics for establishing an appropriate model of sedimentary basin in strong motion prediction.