

Amplification characteristics in strong motion records on engineering bedrock

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Abstract

Recently, a demand for seismic design of structures is increasingly rising, consequently, leading demand to improve various engineering skills, for example, dispersion of earthquake force using base isolation devices. Therefore, the vibration period of structures tends to be longer. In the standard seismic design of road and highway bridges, the engineering seismic bedrock is used to specify the design ground motion. The engineering bedrock has been assumed to be the sedimentary layer, where the S-wave velocity is more than 300 m/sec. However, from the seismological viewpoint, the seismic bedrock should be the most upper part of the crust, where P and S-wave velocities are 5 km/sec and 3 km/sec, respectively. The depth to the seismic bedrock is several kilometers in Kanto plain. From this point of view, estimation of long-period ground motions considering the deep structure is very important and need to be reflected in the seismic design.

First, this investigation was carried out as fundamental estimation for understanding characteristics of basement amplification in Kanto Plain. This measurement has estimated difference of establishment for both seismic basement and engineering bedrock, by using the data attained from strong motion observation.

The amplification factor is assumed from ratio of both seismic basement and engineering bedrock, and the result of this research is calculated in Fourier spectrum obtained by strong motion n observation established spatially in Kanto plain.

This result is used for the estimation of ground amplification characteristics.

The result of correspondence for depth distribution of basement is indicated by Koketsu (1995) and Suzuki (1996), and spectral ratio obtained strong motion records shows difference of characteristics amplification in strong motion observation points.

In case, the depth of basement shallows, amplification factor shows a tendency of high value in short periods. As a matter of fact, the depth of basement deepen, amplification factor shows a tendency of high value in all periods.

These results shows estimation for earthquake ground motion on engineering bedrock, not depend on the depth of basement, should not be treat a matter in the same way. Seismic response should be affected by deeper parts of underground structures than those of seismic basement.