

Blind Prediction Using the Extended Quasi-Three-Dimensional Ground Model

by

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1. Introduction

After receiving the observed results and comparing them with our predicted results, I recognized that some mistakes might exist both in our prediction and in the site selection carried out by the committee of ESG 1992. The followings are my personal comments.

2. Discussions

The model used for blind prediction was the hybrid one, consisting of spring mass systems and two-dimensional finite plate elements distributed horizontally. The model requires horizontal boundaries such as free, fixed or viscous boundary. However, the blind prediction site can not be simply characterized by a simple valley, which means a basin bounded by sloped bedrock. Thus, when the valley was modeled, hypothetical boundaries were introduced in the analyses. At the points on the boundaries, viscous dampers were introduced. However, the energy due to the reflection of seismic wave could not be absorbed successfully. The reflection on both fixed and viscous boundaries, then, occurred intensively.

Comparing the response spectra of prediction and observation, peaks of spectra are almost coincident with each other, within the period of 0.5 sec. However, the spectral amplitude of predicted results is much higher than that of the observed ones, which means that the reflected waves passed through the prediction points repeatedly. In other words, the time duration of predominant vibration is much longer in the prediction than that in the observation, which was recognized in the time histories of predicted results.

3. Conclusions

There was a discussion regarding the fact that even one-dimensional analyses would produce reasonable results. However, such decision should be made, when the prediction is conducted at the site, where two-dimensional or three-dimensional irregularities of surface ground affect the seismic motion of surface ground strongly.