

Study of Constraint Condition on Spectral Inversion

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In the spectral inversion analysis, the site amplification factor is obtained only as a relative value with respect to a reference site. The authors have proposed the new criteria in selecting the reference rock site for the analysis. In the new criteria, following condition is required for the reference rock site.

1. Shear wave velocity averaged over top 10 meters is equal to or greater than 400m/s.
2. More than 5 earthquakes are recorded.
3. The site amplification factor is minimum among sites that satisfies the conditions 1 and 2.

Different reference sites can be selected for different frequencies. The condition 1 is needed to prevent soft soil sites from being selected as a reference site because soft soil sites sometimes show very small site amplification factors at high frequencies due to low-Q values of surface layers.

The result for Kanto area, based on this criteria, coincides with the result from Nozu et al.(2003). The fixed rock site is currently determined as one of the sites with the minimum amplification factor. The amplification factor obtained using this criteria in Kyushu area coincides with the factor based on 1-dimensional response analysis at sites with less influence from 3-dimensional effect.