Attenuation character in high frequency range of the records during the 1995 Hyogo-Ken Nanbu Earthquake

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INTRODUCTION

The spectral attenuation character in high frequency range during large event is examined in this paper. Usually, the simulated spectrum calculated by the empirical Green's function method is overestimated in high frequency range (for example, Kamae and Irikura, 1997 and Ikeda et al., 2002).

OUTLINE OF ANALYSIS

The stochastic Green's function method considering an empirical site amplification factor estimated using small earthquakes data is adopted for simulation. If a spectral attenuation character of large event in high frequency range is the same as that of small event, simulated spectrum is similar to the observed one. If a spectral attenuation of large event in high frequency range is larger than that of small event, simulated spectrum is larger than observed one and it is necessary to correct it by a high-cut filter. The most suitable coefficients, f0 (fmax) and s (filter slope), in the equation of high-cut filter, are examined by trial and error.

The source model of the target large event, the 1995 Hyogo-ken Nanbu Earthquake, proposed by Kamae and Irikura (1997) is used. The target sites are four sites of CEORKA network; ABN, CHY, SKI, and TDO. The site amplification factor at the sites is calculated by Tsurugi et al. (2002)

RESULT

The obtained value of most suitable coefficients, f0 and s, are in shown below.

f0 is from 11Hz to 12Hz, s is about 0.5 for ABN

f0 is from 10Hz to 11Hz, s is about 0.5 for CHY

f0 is from 8Hz to 9Hz, s is about 1.0 for SKI

f0 is from 8Hz to 9Hz, s is about 0.5 for TDO

Moreover, it's become clear that spectra filtered using common values of coefficients for all sites (f0 is 8Hz, s is 1.0) is also similar to observed one.

The obtained filter is designed to correct difference of spectral attenuation between large event and small event. Therefore, the high-cut filter can be applied to result of strong ground motion prediction by the empirical Green's function method or the stochastic Green's function method using empirical site amplification factor, and cannot be applied to result of the stochastic Green's function method using theoretical site amplification factor. In last case, the cut-off filter obtained from large event directly, such as the filter proposed by Kagawa et al. (2003), can be applied to result of the stochastic Green's function method using theoretical site amplification factor.