AMPLITUDE AND PHASE CHARACTERISTICS OF THE DUZCE BASIN FOR THE STRONG MOTION SIMULATION OF THE 1999 DUZCE EARTHQUAKE

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In most of applications to simulate an earthquake motion with the stochastic Green's function, only amplitude characteristics are taken into consideration. Phase characteristics are often disregarded or just assumed to be random. However, when seismic waves take multiple paths from the source, phase information becomes vital to calculate the arrival time of waves. It has been shown by many researchers that the standard deviation of a group delay time, which is basically the first derivation of an unwrapped phase spectrum of an earthquake record, is related to the shape of its envelope in the time domain. Further, the mean value represents the location of the maximum of the envelope. Hence, this suggests the accurate calculation of the duration of a stochastic Green's function especially at the basin structure region. Based on the assumption stating that the observed ground motion can be represented as the multiplication of source, site and propagation effects, group delay time also can be regarded in a similar manner.

The main objective of this study is to investigate the amplitude and phase characteristics of the Duzce Basin using observed strong motion data. We have used the aftershock records of 1999 Duzce event recorded at 15 stations located in and around the Duzce Basin within the epicentral distances of 50 km. Strong motion records were provided from the temporary array of Earthquake Engineering Department of Bogazici University and Columbia University. We have estimated the amplitude characteristics through a spectral inversion method using several events and stations. Regarding phase information, we have calculated the group delay time and mean and standard deviation of each waveform through a wavelet transformation to represent their frequency content variation with time. We have investigated the scattering of the group delay time in and edge of the basin to check the directivity effect. For further steps, this information will be used to get the precise Green's function calculation for the stochastic simulation of the strong ground motion. Results can also be the reference to create a sample phase spectrum for this region.