



Generation of engineering bedrock earthquake motion using harmonic wavelet analysis of measured earthquake seismograms

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It is important to determine the engineering bedrock (shear wave velocity of 760 m/s) earthquake motion for the seismic design in the civil engineering. The energy stored in the fault is released through one cycle of earthquake event consisting of foreshocks, main shock and aftershocks of earthquake. The foreshocks, main shock and aftershocks of earthquake measured on the bedrock can be assumed to be the output signal of the system consisting of the fault and the wave travel path between the fault and the bedrock. These output signals include sufficient information about the system. Each earthquake seismogram is considered as a amplitude modulated (AM) signal and the AM signal is represented by the magnitude (or energy) and phase function with time. So, if the probability distribution function (PDF) of the magnitude and phase function are defined, then the possible output signals (earthquake motions) of the system could be generated. In this paper, the method to generate the possible bedrock earthquake motions based on the harmonic wavelet analysis is proposed. In this methods, the PDFs of the magnitude and phase functions of the earthquake seismogram are evaluated through the harmonic wavelet analysis of the foreshocks, main shock and aftershocks of earthquake measured on the bedrock, and the possible bedrock earthquake motions are determined using the inverse harmonic wavelet transform and the PDFs of the magnitude and phase function of the earthquake seismogram.