S230-006 **Room: 303** **Time: May 21 16:33-16:45**

An experimental study of the boundary between random heterogenous media and equivalent homogeneous meida.

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Seismic waves fluctuate due to the small-scale heterogeneity in the earth. Laboratory scale-model experiments are employed to study effects of small-scale heterogeneity on seismic waves. A laser Doppler vibrometer has been used to detect elastic waves propagating through random heterogeneous media. When two observation points are equal in terms of source radiation pattern and source-receiver distance, the waveform difference between two observation points are primarily due to the random heterogeneity between the source and observation points. When a circular array and a wave source have the same axis of symmetry, each waveform at the array point is the same for homogeneous media, but the waveforms fluctuate in random heterogeneous media.

We used waveforms obtained at 180 points of a circular array on the surface of a Westerly granite block. The source is a disc-shaped piezoelectric transducer, which produces axisymmetric radiation pattern for P and S waves. We investigate waveform fluctuation by calculating cross spectral amplitudes and phases for the two time-windowed waves of the array. Employing the multivariate AR model, we calculate cross spectra between two waveforms. Cross spectrum depends on the distance between two observation points, but it becomes almost equal when the distance exceeds a certain value. Cross spectral amplitudes and phases for 180 pairs of waveforms were investigated.

We found cross spectral amplitudes are almost independent of frequency. However, the cross spectral phase changes with frequency.

The phase values are clustering around zero in low frequencies, but they distribute widely in high frequencies. This suggests that the phase difference between two waves is close to zero in low frequencies. The difference becomes large and distributes widely in high frequencies.

An abrupt change from the narrow distribution to the wide distribution appears at a certain frequency around 0.75 MHz, which corresponds to ka 0.2-0.3 and kL 200-300 in terms of the scale-invariant quantities, where k is the wave number, a is the correlation length of random heterogeneity and L is the travel distance of wave.

We consider that the scale-invariant relation indicates a boundary between an equivalent homogeneous medium and a random medium. The mean square of the velocity fluctuation in Westerly granite is 0.0064, which is larger than the value used for Aki and Richards (1980), 0.001. The boundary between equivalent homogeneous medium and random medium shifts slightly lower value of ka due to the larger value of the meean square of the velocity fluctuation.