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Frequency Dependency of Elastic Wave Speed and Attenuation - in seismic wave range -

Hironori Kawakata[1*], Issei Doi[1], Nana Yoshimitsu[1], Naoki Takahashi[2]

[1]Ritsumeikan University, [2]Sumitomo Mitsui Construction Co., Ltd.

Major rock properties such as elastic wave speed and attenuation are essential for estimating Earth's internal structure. Generally, laboratory measurements are held using a frequency band between 100 kHz and a few MHz, which is far from seismic frequency band. It is not cleared whether these properties are constant over such a wide frequency range. Kawakata et al. (2010, SSJ) studied the elastic wave speed from 100 kHz to 2 MHz using elastic wave radiation. In this study, we carried out cyclic loadings using a Westerly granite sample, and estimated elastic wave speed and attenuation through complex elastic modulus using stress-strain relationships between 0.1 Hz and 10 Hz. The amplitude of complex elastic modulus showed weak positive correlation with frequency, while phase shift showed no remarkable dependence on frequency.

Keywords: laboratory experiment, cyclic loading, elastic wave speed, elastic wave attenuation, frequency dependence