Acquiring distributions of phase velocity for wave frequency to use DAS for surface wave method

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Recently, the distributed acoustic sensing (DAS) technology has been developed and the development speed is accelerated. Test surveys using test wells of petroleum production are frequency reported. In shallow geophysics, DAS will be useful technology for a low-cost sensor to monitor for long ranges. The main method of geophysical exploration using elastic wave for river banks and shallow soil structures is surface wave method. When we want to use DAS technology to survey shallow soil structure, it is important to acquire and analyze surface waves. We acquired events of surface wave on DAS records using optical fiber set in shallow ground in our research institute (PWRI, Tsukuba). DAS records show lower s/n than the records from standard geophones, but we can find propagation of surface wave on the DAS records. We analyzed phase velocities on different frequencies using CMP-CC method and acquired fine images of dispersion property. The minimum wave length we specified is about 6.5 m to acquire phase velocity. However, we cannot analyze phase velocity in some CMP points and we search reasons to improve analysis methods. When phase velocity curves will be stably acquired, surface wave method is applied by DAS technology and development of DAS for shallow geophysics will be accelerated.

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