1. Predicting Seismic Velocity Ahead of Tunnel Face using Drilling Vibration of Hydraulic Drilling Machine

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A new investigation method has been developed for determining the distribution of the velocity of seismic wave (seismic velocity) transmitted through the rock ahead of the tunnel face by measuring and analyzing the vibration generated by a hydraulic drill cutting into the rock during drill logging. In this method, advance drillings are conducted at two or more locations at the tunnel face. Then, by performing seismic tomography analysis using the propagation time data obtained, the two-dimensional seismic velocity distribution in the ground ahead of the tunnel face can be determined.

The new investigation method was field-tested in a mountain tunneling project, and the results thus obtained confirmed the following:

i. The seismic velocity distribution are consistent with the drilling energy obtained by the drill logging method and the ground properties observed after the excavation.
ii. Seismic velocity as a property of the ground can be determined in the form of two-dimensional distribution data.

Key words: drill logging , hydraulic drilling machine , ahead of the tunnel face , seismic tomography