

Development of Thermal Property Measurement Procedure of Cuttings by Theory of the Transient Plane Source

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In the field of earth engineering related to natural resource development and of earth science that studies seismogenic zone, it is important to know thermal properties of the layers to understand the underground temperature structure. Measurement with a core sample that is generally performed can easily and accurately measure thermal properties, but in many cases, core samples can not be gathered. Therefore, even when we can get only cuttings samples, it is required to obtain thermal properties. In the previous study, there was a case where the measurement was carried out by the divided bar method requiring measurement time. In this study, we have experimentally examined the measurement procedure using the Transient Plane Source method (so called, hot disk method) which is excellent in speed and accuracy. In this study, we used cuttings samples and core samples taken at C0009 A hole of Nankai Trough Seismogenic Zone Experiment (commonly called, NanTroSEIZE) conducted by Chikyu as part of IODP. This study aimed at establishing the thermal property measurement method using. In order to estimate the accuracy of the proposed method, we used as a reference sample, quartz glass samples which are homogeneous and are known thermal properties. Here, the measurement results of the quartz glass grain sample and the core quartz glass sample were compared, and we verified the accuracy of the method. Then, in order to check application to rock samples obtained by actual scientific excavation and to verify accuracy, next experiments were carried out using cuttings samples and core samples taken from C 0009 A hole by using a method in which sufficient reliability was confirmed with a reference sample. We can confirm sufficient reliability of measurement with a quartz glass. Rock samples also could be measured with good accuracy, but there are variations from sample to sample, so there is room for improvement.

Keywords: Thermal property, Cuttings, the Transient Plane Source(Hot Disk Method)