

Making of large scale ice block simulating shallow type methane hydrate for performance confirmation of submarine drilling rig

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Shallow type methane hydrates (MH), which are attracting attention as a future energy resource, exist as a massive solid beneath the seabed. In order to obtain the design data of the drill for excavating this shallow type MH, large ice blocks simulating the MH were prepared and the mechanical property of ice was evaluated. Large scale ice blocks were prepared outdoors in winter season at Kitami Institute of Technology. The dimensions of the water tank for preparing the ice block are 3 m square and 1 m high. Water cooled close to 0 degree was put into a water tank every 5, 10 or 20 cm and frozen. An ice block about 1 m in height could be manufactured in about two months.

Unconfined compression tests were performed for ice frozen in a water tank, commercial ice, and ice frozen under various conditions in laboratory. As a result, the similar compressive strength was obtained regardless of the frozen method. In addition, the strength of ice was similar or slightly higher than that of natural MH (Yoneda et. al., 2019). Furthermore, the stiffness of ice was higher than that of MH. Therefore, it was found that the performance confirmation test of the drilling rig was possible using the ice prepared by the method of this study.

Keywords: methane hydrate, ice, drilling rig

