Residual Stress Measurements for Rocks by TOF Neutron Diffraction Methods

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When using the rock, to know the pressure which rock had received in underground is important. It is thought that the rock is maintaining the stress received in underground as residual strain. It is possible to presume the pressure under the earth in order to measure the residual stress for the rocks.

In this report, we have made an experimental study to measure the residual strain of granite rocks by neutron diffraction using Sirius diffractometer at KENS, KEK. The d-spacing from powder sample was used to calculate the residual strain instead of the unstressed d-spacing. The maximum residual stress for quartz in granite used for this experiment is 34.4Mpa.

We also made the uniaxial compression experiments using the compression-testing device for Sirius diffractometer to get the relationship between strain by neutron diffraction and applied stress. The residual stress for quartz evaluated from the result of compression experiments is 5.5 MPa. The difference in two result of residual stress will be discussed. The result using marble rocks will be also reported.

Keywords: residual stress measurements, neutron diffraction, granite rock