

Measurements of strain changes along a borehole in a landslide using distributed fiber optic sensing

*Tetsuya Kogure¹, Yudai Okuda²

1. Interdisciplinary Graduate School of Science and Engineering, Shimane University, 2. Interdisciplinary Faculty of Science and Engineering, Shimane University

A fiber optic cable was installed in a borehole with its depth of 16 m in an actual landslide, to which a local government had already taken some countermeasures, to detect a vertical profile of strain changes. Distributed fiber optic sensing analyzing Rayleigh backscattering was adopted in this study: spatial resolution was set at 10 cm, and strain resolution was 1.87 $\mu\epsilon$. Strain changes were measured for every 6 hours from the middle of June to that of October 2017. The measurement produces a very clear-cut vertical profile of strain changes with particular concentration at different depths including the slip plane at 8 m deep although the deformations are not so large for urgent landslide. Visualization of unknown deformation of mudstone layer below the slip plane has also been achieved. Therefore, this method has been found to be a promising method in measuring strain changes for rocks in any fields.

Keywords: distributed fiber optic sensing, landslide, monitoring, strain change