



Development of landslide monitoring system by use of optical fiber extensometer and its field applications

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Electric sensors are commonly used in extensometers for landslide monitoring, while their issue of maintenance due to lightning attraction and difficulty to locate damaged parts of transmission cables are frequently pointed out. To clear these issues, optical fibres have been increasingly taking over electric sensors for extensometers, although their feasibility needs to be examined more. In this presentation a fiber-optic extensometer the authors developed and the results of the tests to examine their feasibility are introduced. The extensometer is adopted the Optical Time Domain Reflect-meter (OTDR) method, which is particularly economical and widely used among several methods of fiber-optic sensing.

In the test carried out in a landslide site, the extensometers installed produced approximately ± 1 mm of diel noise, which was considered to be caused by temperature dependency of the extensometer transducer and the OTDR. Following the result the transducer was adjusted to reduce temperature effect and the location of the OTDR was transferred to a place where the range of temperature change is small. Consequently the diel noise was reduced to approximately ± 0.5 mm, which is the same as conventional extensometers.

Anticipating installation of this extensometer in heavy snowfall regions where devices are often damaged by snow loads, a newly developed installation method by the authors was also examined. Setting up in a snowy area following the method and running

the device throughout winter, the test proved that the method was appropriate to sustain the function of the device even in the condition.

The results suggested the extensometers using the OTDR are feasible enough to apply to the field including heavy snowfall regions. Hence landslide monitoring systems employing these devices are considered to become more common in future.