

## Neutron Measurement Technology for the Proactive Maintenance of the Social Infrastructure

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We have been conducting research on non-destructive inspection techniques using neutron measurement for the proactive maintenance of the social infrastructure. RANS-III (transportable RIKEN Accelerator-driven compact Neutron Systems) is under development and responded to on-site needs to the recent global increase of cable-stayed bridge falls and other accidents that have occurred due to water infiltration in cable-anchorage, unfilled grout in cable, etc. In other words, by detecting the progression of internal deterioration at an early stage, repairs can be made before severe damage occurs, thereby shifting from after-the-fact maintenance to proactive maintenance, aiming to reduce maintenance costs and extend the service life of social infrastructure. This study reports on the development of a floor-standing type RANS-II, a prototype of RANS-III, as a preliminary experiment prior to the operation of the transportable RANS-III. An experiment of non-destructive inspection technology for test cable of cable-stayed highway bridge was conducted to detect infiltrated water in the test cable. In this experiment, a two-dimensional neutron position time-of-flight detector using He-3 gas is used as a neutron detector. As a result, by comparing the amount of flow out neutron to the side of the cable with and without simulated infiltrated water (acrylic rod 15 mm in diameter, containing neutron-sensitive hydrogen) in the cable (160 mm in diameter), increase of the neutron flow out was detected with the presence of simulated infiltrated water even in 1% of the cross sectional area of 160 mm in cable diameter. In the future, we will develop a method for detecting internal deterioration of bridge cable and highway road using the RANS-II neutron beam and neutron position detector, leading to on-site use of the transportable RANS-III.

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