RIKEN Accelerator-driven compact neutron systems and RANS project - RANS developments and achievements for a sustainable society -

Yoshie OTAKE

Neutron Beam Technology Team, RIKEN Center for Advanced Photonics, RIKEN

At RIKEN, two accelerator-driven compact neutron systems are currently operating independently and are used daily by companies and researchers for experiments and advanced developments using neutrons.

The objective of the RANS (RIKEN Accelerator-driven compact neutron systems) project is to maximize the potential of compact neutron sources from the point of view of on-site use and to develop a n novel model of easy-to-use compact neutron system that meets the needs from the point of view of non-destructive testing, in order to realize a sustainable society. There are two main needs: indoor applications for the non-destructive testing and analysis of various materials and products, and outdoor applications for the detection of deterioration to ensure the safety of infrastructure. In both cases, on-site use is a key feature.

In order to maximize the potential of the compact neutron source, the first RANS instrument including cold source system has been improved and RANS-II has been further developed as a more compact system. RANS has succeeded in developing a new development that enables stress measurement. RANS-II produces the same characteristics of the neutron beam as the trans-portable system of RANS-III and has succeeded in developing new measurement techniques such as floor slab deterioration, detection of thin water existence in suspension bridge cables, etc. as a non-destructive visualization technique for outdoor use of as a non-destructive inspection technique for infrastructure, which is one of the important development goals of the RANS project. The design of the shielding system around the neutron source and detectors for outdoor use of RANS-III has been started, and the construction for indoor tests before outdoor use will be started in the next fiscal year.

The development of the RANS-μ with 252Cf, initiated to meet urgent requirements, is progressing steadily and outdoor tests were carried out in December 2021

All the activities including T-RANS (Technical research association of neutron next generation system) and the potential of the compact neutron system will be discussed.