Contribution ID: **22** Type: **Invited Talk (Category for invited speakers only)**

RIKEN Accelerator-Driven Compact Neutron Systems, RANS Project

Wednesday, 26 February 2025 09:00 (40 minutes)

At RIKEN we have developed compact neutron source systems for on-site quantitative evaluation for practical use. There are two major goals of our RANS Project's research and development. One is to establish and realize CANS (Compact Accelerator-driven Neutron Source) models that can be easily operated, non-destructively measured, and quantitatively evaluated, as a floor-standing type for industrial use as non-destructive analysis equipment. Another goal is to invent a novel transportable compact neutron system for the preventive maintenance of large-scale construction such as bridges and highways Two accelerator-based compact neutron source systems, RANS (7 MeV proton, Be target) [1] and RANS-II (2.49 MeV proton, Li target), as well as RANS-μ (252Cf) which have started real bridge measurements, are in constant operation. The transmission imaging, neutron diffractometer towards stress measurement, small angle scattering instruments with thermal and cold moderators at RANS, fast neutron scattering time-of-flight imaging, neutron activation analysis at RANS and RANS-II are available, and neutron-induced prompt gamma-ray analysis with RANS-μ.In addition, RANS-III, a transportable compact neutron system for non-destructive inspection of bridge decks, and cable-stayed bridge anchorage deterioration detection [2] by fast neutron scattering time-of-flight imaging [3] is being developed for onboard use. In 2025, fast neutron scattering imaging experiments with the RANS-III mounted on a trailer are planned to be carried out indoors to visualise the deterioration of the floor slabs of real bridges outdoors.

References
[1] Y.Otake, "A Compact Proton Linac Neutron Source at RIKEN", "Applications of Laser-Driven Particle Acceleration"eds. Paul Bolton, et al. (2018) Chapter 19 pp.291-314 CRC Press
[2] T.Fukuchi, et.al. Proceedings of the concrete structure scenarios, Journal Society of Material Science, Japan 24 pp.565-570, (2024)
[3] Y. Ikeda, et al. Plasma and Fusion Research Vol.13(2018) pp.2406005-1-5

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Funding Agency

Abstract classification - track type

Facility Updates

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Session Classification: Session 6