

Development of accelerator-driven compact neutron source for non-destructive inspection of infrastructure constructs.

Wednesday, 29 November 2017 18:34 (6 minutes)

A compact neutron source by using a particle accelerator is a promising tool for practical material analysis, infrastructural diagnostics, nuclear detection, and medical treatment. We have been operating the neutron source RANS (RIKEN Accelerator-driven compact Neutron Source) with 7 MV proton LINAC and a beryllium target for 5 years and learned a lot about experiment, maintenance and safety management. In recent years, imaging with fast neutrons, engineering diffraction for texture evolution estimation and austenite volume fraction, prompt-gamma neutron analysis (PGA) are the major activities. The weights of the accelerator section and the target station of RANS are 5 tons and 25 tons, respectively. For outdoor use of neutrons source for such as non-destructive inspection of old constructs, it is required to develop a system smaller and lighter. We have started R&D of a mobile neutron source "RANS2" with a newly designed proton RFQ. We chose lithium for the target and the energy of proton was set at 2.49 MV. Total neutron yield per proton current of 100 uA is estimated to be 1011 neutrons / sec. The present status of the project is as follows. The design and the fabrication of the ECR proton ion source and the RFQ LINAC were completed including vacuum and cooling tests. Ion generation and acceleration is in preparation. Design of the lithium target including cooling system, neutron reflector and shielding is underway by performing numerical simulation. The total system will be completed in 2018.

Formal Invitation Letter Required

No

Primary author: Dr KOBAYASHI, Tomohiro (RIKEN)

Co-authors: Prof. HAYASHIZAKI, Noriyosu (Tokyo Institute of Technology); Dr OTAKE, Yoshie (RIKEN); Dr IKEDA, Yujiro (RIKEN); Mr KUSHIMA, Yusuke (Tokyo City University)

Presenter: Dr KOBAYASHI, Tomohiro (RIKEN)

Session Classification: Nibbles - Poster, Sponsors DENIM Challenge