Contribution ID: **10** Type: **Poster**

The implementation of a charge coupled device (ccd) camera in a neutron imaging system for real time and tomography investigation

Wednesday 30 August 2017 17:30 (1h 30m)

Khairiah Yazid, Muhammad Rawi Mohamed Zin, Rafhayudi Jamro, and Azraf Azman

Malaysian Nuclear Agency Bangi 43000 Kajang Selangor MALAYSIA

Email: khairiah@nuclearmalaysia.gov.my

The Malaysian Nuclear Agency (Nuclear Malaysia) operates the one and only research reactor in Malaysia, Reactor TRIGA PUSPATI (RTP) of Mark II type, commissioned on 28 June 1982. It has a nominal power of 1 MW designed to effectively implement various fields of basic and applied nuclear research or services, education and training. The PUSPATI TRIGA is a swimming pool-type light water research reactor with enriched uranium-zirconium-hydride fuel and graphite reflector. There are three radial beam ports, one tangential beam port and one thermal column. The maximum steady state operating power of the reactor is 1MW and at this operating power the thermal neutron flux at the edge of the reactor core is around $2.797 \times 10^{12} n/cm^2/sec$.

Neutron radiography has been developed at one of the radial beam ports since 1980s, but with a stagnation of a long period. The direct exposure technique using Gadolinium foil converter and Kodak SR45 (SR5) film was established using this facility. However, this facility has low thermal neutron intensity at the sample position, which leads to long irradiation times; it gives many limitations for the industrial applications. A process has begun to upgrade the neutron radiography facility from film-based neutron radiography into digital neutron radiography. Now, the neutron radiography facility has been re-developed during these years, a new improved collimator has been planned and designed and a new instrument for neutron radiography and computed tomography will be set up at the neutron facility.
A major step in the improvement of the neutron radiography activity at PUSPATI TRIGA Reactor is the implementation of digital neutron detector for fast neutron radiography. The new neutron detector is based on a scintillator, a front coated mirror, lenses and a cooled scientific CCD camera.

Recently, preliminary testing after the implementation of digital neutron radiography based on CCD neutron camera has been done using SANS beam port due to neutron facility is currently under construction. The neutron beam intensity at SANS beam port is estimated to be $10^3 n/cm^2/$ s with the TRIGA reactor operating at 750kW.

Several experiments have been performed on this experimental station using the new digital neutron CCD camera. The results have demonstrated that the new digital neutron CCD camera show high potential to inspect low-thickness samples. Until now just a few experiments were studied and a systematic study is still pending. More work will be explored on real time neutron radiography using the new digital neutron CCD camera at neutron facility beam port. The most important property, the performance of the imaging instruments will be quantified.

As the conclusion, the research and development in neutron imaging by utilizing PUSPATI TRIGA reactor is positively active. Further support from IAEA and other member countries is needed especially related to the upgrading of the neutron radiography/tomography facility. We also wish to cooperate and exchange each other with all colleagues in the world!

Author: KHAIRIAD, Yazid (Malaysian Nuclear Agency Bangi)

Session Classification: Poster