Contribution ID : **47** Type : **Oral**

Conceptual design of a thermal neutron imaging facility at the Jordan Research and Training Reactor (JRTR) optimized by Monte Carlo neutron ray-tracing simulations

Friday, 7 September 2018 09:00 (20)

Abstract
Recently, the Jordan Research and Training Reactor (JRTR) has officially got its operating license. The JRTR, 5 MWt, upgradable to 10 MWt, and neutron fluxes of orders of 10^14 n/cm2.sec, has started its activities to provide multi-purpose services according to the potential utilization plans. This paper discusses one of the most important and primary instruments in regards to the utilization of the nuclear research reactors, and spallation sources as well, that is a thermal neutron imaging facility (NIF) to be installed at the sufficiently wide experimental hall of the JRTR site and be opened for local and international users of both sectors academia and industry. This paper focuses on the detailed works of the designing, optimizing, and verification stages of the conceptual design of the JRTR-NIF applying Monte Carlo simulations using McStas neutron ray-tracing packages. Initial simulation results show that the JRTR-NIF can provide competing flux values ranging between the orders of 10^6 ~ 10^7 n/cm2.sec at various sample positions, coupled with various L/D collimation selected ratios ranging between 80 ~ 1200, as well as good beam sizes, “effective” beam sizes up to 20 cm in diameter, with good resolutions compared to other pioneer facilities worldwide in order to cover a wide range of advanced applications required by various types of users.

Keywords
JRTR, Jordan, Neutron imaging, Neutron radiography, Neutron beam instrumentation, nuclear research reactor utilization, and Monte Carlo simulations.

***Corresponding author:** bsseong@kaeri.re.kr, +82-10-3424-8442, KAERI institute, 989-111 Daedeok-daero, Yuseong-gu, Daejeon 34057, Republic of Korea.

Primary author(s) : Mr SUAIFAN, Mahmoud (1University of Science and Technology (UST), 217 Gajeong-ro, Yuseong-gu, Daejeon 34113, Republic of Korea, 2Korea Atomic Energy Research Institute (KAERI), 989-111 Daedeok--daero, Yuseong-gu, Daejeon 34057, Republic of Korea, 3Jordan Atomic Energy Commission (JAEC), JRTR Commission, 70 Shafa-badran, Amman 11934, Jordan); Dr KIM, Jongyul (2Korea Atomic Energy Research Institute (KAERI), 989-111 Daedeok-daero, Yuseong-gu, Daejeon 34057, Republic of Korea); Mr ALMOMANI, Saed (1University of Science and Technology (UST), 217 Gajeong-ro, Yuseong-gu, Daejeon 34113, Republic of Korea, 2Korea Atomic Energy Research Institute (KAERI), 989-111 Daedeok-daero, Yuseong-gu, Daejeon 34057, Republic of Korea, 3Jordan Atomic Energy Commission (JAEC), JRTR Commission, 70 Shafa-badran, Amman 11934, Jordan); Dr LEE, Jongmin (2Korea Atomic Energy Research Institute (KAERI), 989-111 Daedeok-daero, Yuseong-gu, Daejeon 34057, Republic of Korea); Dr SEONG, Baek-Seok (2Korea Atomic Energy Research Institute (KAERI), 989-111 Daedeok-daero, Yuseong-gu, Daejeon 34057, Republic of Korea)

Presenter(s) : Mr SUAIFAN, Mahmoud (1University of Science and Technology (UST), 217 Gajeong-ro, Yuseong-gu, Daejeon 34113, Republic of Korea, 2Korea Atomic Energy Research Institute (KAERI), 989-111 Daedeok-daero, Yuseong-gu, Daejeon 34057, Republic of Korea, 3Jordan Atomic Energy Commission (JAEC), JRTR Commission, 70 Shafa-badran, Amman 11934, Jordan)

Session Classification : Speaker Sessions and Seminars

Track Classification : Instrumentation