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EDITORIAL

Dear readers,

We are delighted to present the third issue of Atom Indonesia, Volume 50 No. 3 (2024), featuring ten articles that highlight the advancements and applications of nuclear science and technology. These contributions come from a diverse group of authors representing both national and international institutions, emphasizing the global importance and collaborative nature of nuclear research.

The first article "The Impact of Different Light-Reflecting Materials Compositions of ($LaBr_3$:Ce) Scintillation Detector on Spent Nuclear Fuel Gamma Spectrum" examines the impact of light-reflecting materials in ($LaBr_3$:Ce) scintillation detectors, particularly in their ability to resolve high-activity fission products in spent nuclear fuel spectra. The study employs MCNPX code to simulate spectral responses, revealing that $LaBr_3$:Ce detectors deliver superior resolution and can distinguish closely spaced peaks of various radioisotopes. These findings underline the potential of such detectors in nuclear safeguards, security applications, and radioactive material testing.

In the line with focus on the theme of advanced simulation methodologies, the second article on "Characterizing Photon Beam Properties of a TrueBeam STx Linear Accelerator: An Evaluation of Geant4/GATE Monte Carlo Simulation Tool Performance" evaluates the photon beam properties of the TrueBeam STx linear accelerator using the Geant4/GATE simulation toolkit. By comparing flattening filter and flattening filter-free configurations, the study validates simulation results against experimental measurements. The excellent agreement in depth dose profiles and other beam characteristics underscores the precision of this simulation tool in modeling photon beam properties.

Similarly, the article with title "Radiation Dose Calculation Analysis During the Dismantling of Disused Sealed Radioactive Sources at CNESTEN: MCNP Code Simulation Results" emphasizes the importance of simulation tools in occupational radiation safety. It presents a study on occupational radiation protection presents dosimetric analyses during the dismantling of disused sealed radioactive sources (DSRS). Using MCNP simulations, researchers calculated operational quantities for hands and feet exposure during the dismantling of a ^{60}Co source. These results provide critical insights into radiation exposure risks, offering data to refine safety measures and ensure compliance with regulatory limits for workers in such environments.

Next article on "The Modelling and Analysis of iPWR-Type SMR Core Dynamics: Control Rods, Reactivity Feedback, and Thermal-Hydraulic Effects" explored related Small modular reactors (SMRs), with a focus on the modeling of core dynamics for an iPWR-type reactor. By integrating point kinetics equations with thermal-hydraulic modeling, the study demonstrates the potential of SMR core simulations for educating stakeholders and preparing human resources in nuclear power plant development. The findings provide a reliable framework for understanding SMR operational dynamics in Indonesia's nuclear energy plans.

Article on "Comparison of the Thermo-Hydraulic Response of MELCOR 1.8.6 and 2.1 for SBO Accident for APR 1400 Reactor" discussed the thermo-hydraulic response analyses for a station blackout scenario in an APR 1400 reactor reveal differences between MELCOR versions 1.8.6 and 2.1. This comparative study highlights key parameters such as fuel cladding temperature and containment pressure changes, providing valuable insights into reactor safety and accident management under different modeling frameworks.

The integration of gamma-ray spectrometry with drone technology is also featured on the article "Ground-Based Gamma-Ray Spectrometer Application on Drone-Borne: Suitability and Height Attenuation", showcasing advancements in radiometric mapping. The study evaluates the suitability

of ground-based spectrometers for drone-borne applications, identifying optimal flight altitudes and demonstrating the effectiveness of this approach for dose rate measurements and radionuclide mapping. This innovation highlights the growing role of UAVs in environmental monitoring and radiation assessments.

Additionally, an investigation into the dose response of TLD-700 and TLD-900-based ring dosimeters exposed to Sr-90 beta radiation explores key parameters such as distance, irradiation angles, and duration were explored on article “Dose Response of Hp(0.07) on TLD-700 and TLD-900 Based Ring Dosimeters to the Sr-90 Exposure”. The findings confirm the dose response's dependence on these factors, offering insights into improving extremity dosimetry for radiological safety in workplaces.

The issue on a study assessing radioactivity levels in soil and building materials in urban areas of Niger was also featured in the article on “Assessment of the Level of Radioactivity in the Soil in Urban Areas and Building Materials of Arlit City (Agadez-NIGER)”. With a focus on uranium mining activities, the paper provides critical data on radionuclide distribution and potential environmental impacts, emphasizing the need for effective monitoring in mining regions in Arlit Niger.

The ninth article, “Radiation Dose Prediction for Cervical Cancer Patients Using IMRT Technique with a Machine Learning Model Based on Support Vector Regression (SVR),” highlights the use of machine learning to improve radiotherapy precision. The authors developed an SVR model to predict dose distributions in cervical cancer patients, achieving strong accuracy (MAE: 0.069). The approach aims to refine radiotherapy planning, reduce physicist workloads, and enhance patient outcomes, with further studies recommended for anatomically complex cases.

The last article on “Estimation of Organ Dose, Effective Dose, and Cancer Risk in Abdominal CT Scan Patients,” evaluates radiation doses in 150 patients undergoing abdominal CT scans. They found the average value of effective dose received by abdominal examination patients is 5.28 mSv with an average cancer risk of 0.029 %. Most doses were below Indonesia’s regulatory standards, though one exceeded ICRP limits, emphasizing the need for dose monitoring and optimization in diagnostic imaging.

Each article reflects significant contributions to nuclear science applications, including reactor safety, radiation protection, and environmental monitoring. On behalf of Atom Indonesia, I would like to thank you all for your contributions and endless support that have enabled Atom Indonesia to achieve an outstanding performance over all the years. This outstanding performance could not have been achieved without the great efforts and cooperation of the editors, reviewers, management personnel, authors, and readers. Enjoy reading.

Editor in Chief