Tri Dasa Mega Vol. 24 No. 1 (2022) 45–46

Jurnal Teknologi Reaktor Nuklir

Tri Dasa Mega

Journal homepage: jurnal.batan.go.id/index.php/tridam

Abstract Collection

Santo Paulus Rajagukguk, Syaiful Bakhri, Tukiran Surbakti., *Analysis of Fuel Temperature Reactivity Coefficient of the PWR using WIMS Code.*, Tri Dasa Mega, 24 (1), 1.

The Fuel Temperature Reactivity Coefficient (FTRC) is an important parameter in design, control, and safety, particularly in PWR reactor. It is then very important to validate any new library for an accurate prediction of this parameter. The objective of this work is to determine the value of the FTRC parameter using the new WIMDS library based on ENDF/B-VIII.0 nuclear data files. For this purpose, it is used a set of light water moderated lattice experiments as the PWR-1175 MWe experiment critical reactors, the reactor using UO_2 fuel pellet. The analysis is used with WIMSD-5B lattice code with original cross-section libraries and WIMSD-5B with ENDF/B-VIII.0 new cross-section libraries. The results showed that the fuel temperatures reactivity coefficients for the PWR reactor using original libraries is – 3.10 pcm/K with enrichment of 3.1% but for ENDF/B-VlII.0 libraries is – 3.00 pcm/K. Compared to the experimental data of the reactor core, the difference is in the range of 6.9 % for ENDF/B-VIII.0 libraries. It can be concluded that for the reactor, it is better to use ENDF/B-VIII.0 libraries because the original library is not accurate anymore.

Keyword: Reactivity coefficient, PWR reactor, Moderator, Fuel pellet, WIMSD-5B

Entin Hartini, Endiah Puji Hastuti, Geni Rina Sunaryo, Aep Saepudin, Sri Sudadiyo, Amir Hamzah, Mike Susmikanti., *Prediction of Remaining Useful Life for Components in SSC of RSG-GAS Based on Reliability Analysis.*, Tri Dasa Mega, 24 (1), 9.

In the maintenance system, efforts are needed to improve the effectiveness of the maintenance system and organization. For effective maintenance planning, it is necessary to have a good understanding of component availability and the reliability of the system. For this reason, it is crucial to determine the remaining component life using Remaining Useful Life (RUL), so that maintenance tasks can be planned effectively. The purpose of this study is to determine the remaining life of the safety category A component from SSC RSG-GAS based on reliability analysis. The method used in this paper is a statistical approach to estimate the RUL. The Weibull hazard model was selected for modeling the hazard function to be integrated into reliability analysis. The model was verified using data from components with safety category A on SSC from RSG-GAS. The results obtained from the analysis are beneficial for estimating the remaining useful lives of these components which can then be used to plan for effective maintenance and help control unplanned outages. The results obtained can be used for maintenance development and preventive repair planning.

Keyword: Remaining Component Life, SSC RSG-GAS, Safety category A, Reliability Analysis

Ign. Djoko Irianto, Sriyono, Sukmanto Dibyo, Djati Hoesen Salimy, Tukiran Surbakti, Rahayu Kusumastuti., *Analysis of Cogeneration Energy Conversion System Design in IPWR Reactor.*, Tri Dasa Mega, 24 (1), 19.

The acceleration of national development, especially in the industrial sector, requires an adequate national energy supply. There are various types of energy sources such as conventional energy sources, new and renewable energy sources including nuclear energy. The problem is how to utilize these energy sources into energy that is ready to be utilized. As a research and development institution in the nuclear field, BRIN has taken the initiative to contribute to the development of technology for providing electricity and other thermal energy, particularly reactor technology as a power plant and a provider of thermal energy. This research aims to analyze IPWR type SMR reactor design as a cogeneration energy conversion system. The IPWR reactor coolant as a cogeneration energy conversion system is arranged in an indirect cycle configuration or Rankine cycle. The primary cooling system and the secondary cooling system are mediated by a heat exchanger which also functions as a steam generator. The analysis was carried out by simulation using ChemCAD computer software to study the temperature characteristics and performance parameters of the IPWR as a reactor cogeneration energy conversion system. The simulation results show that the temperature of saturated steam coming out of the steam generating unit is around 505.17 K. Saturated steam is

obtained in the reactor power range between 40 MWth to 100 MWth. Energy utilization factor (EUF) calculation shows that the IPWR cogeneration configuration can increase the energy utilization factor value up to 91.20%.

Keyword: Energy Conversion System, Cogeneration, IPWR type reactor, ChemCAD, Energy Utilization Factor

Moh. Miftakhul Dwi Fianto, Yohannes Sardjono, Andang Widi Harto, Isman Mulyadi Triatmoko, Gede Sutresna Wijaya, Yaser Kasesaz., *Dose Distribution Analysis of Proton Therapy for Medulloblastoma Cancer with PHITS 3.24.*, Tri Dasa Mega, 24 (1), 27.

One of the developments in particle therapy is proton radiation therapy. Research related to proton therapy is difficult due to a limited number of available proton therapy facilities. Therefore, there is a need for alternative proton therapy simulations using programs other than those in proton therapy facilities. This research was aimed to simulate medulloblastoma brain cancer which is most common in children. The program used in this research was PHITS version 3.24. The human body was modeled with the revised ORNL-MIRD phantom for a 10-year-old child. The therapy scheme was a whole posterior fossa boost of 19.8 Gy RBE. The proton passive scattering was simulated by passing a uniform proton beam through the aperture and compensator with various energy levels. The proton pencil beam scanning was simulated with small cylindrical beams with a radius of 0.5 cm, which were adjusted to the planning target volume with layers variations. The total duration of the prescription dose given was 550 seconds with passive scattering and 605 seconds with pencil beam scanning. In passive scattering, the OAR(s) with the most significant percentage of absorbed dose were the skin, cranium, and muscle, i.e., 8.22 ± 0.15%, 5.51 ± 0.05%, and 1.39 ± 0.04% respectively to their maximum tolerated dose. For the pencil beam scanning, the OAR(s) with the most significant percentage of absorbed dose were the skin, cranium, and muscle, i.e., 5.42 ± 0.08%, 4.43 ± 0.05 %, and 0.51 ± 0.05% respectively to their maximum tolerated dose. In terms of dose homogeneity, dose distribution in passive scattering was relatively better than in pencil beam scanning using dose sampling analysis at some points within the planning target volume.

Keyword: Proton therapy, Passive scattering, Pencil beam scanning, Posterior fossa boost, Medulloblastoma

Wahid Luthfi, Surian Pinem, Donny Hartanto, Lily Suparlina, Dwi Haryanto., *Measured and Calculated Integral Reactivity of Control Rods in RSG-GAS First Core.*, Tri Dasa Mega, 24 (1), 37.

The control rod worth is one of the important parameters for the operation of a nuclear reactor. Proper measurement and calculation of the control rod worth are essential for the safe reactor operation under normal and transient conditions that are initiated by a postulated event such as stuck rod, control rods ejection, etc. This paper presents calculation results of integral reactivity of the RSG-GAS research reactor first core and its comparison with the experimental data. Calculations were performed using the continuous energy transport code Serpent 2 with ENDF/B-VIII.0 nuclear data. Integral reactivity measurement was done by compensating method with control rod bank, regulating rod, and reactivity meter. Calculations were carried out for each method used in control rod measurement data to validate calculated results to experimental data. Compared with the measured experiment data, there are no significant differences in calculation results of integral reactivity. The maximum difference of the control rod's total reactivity is 1.26% compared to the measurement carried out by compensating method with regulating rod.

Keyword: Control rods worth, RSG-GAS, Serpent 2 code, Reactivity, First core

Tri Dasa Mega Vol. 24 No. 1 (2022) 47-48

Jurnal Teknologi Reaktor Nuklir

Tri Dasa Mega

Journal homepage: jurnal.batan.go.id/index.php/tridam

Keywords Index

Tri Dasa Mega Vol. 24 No. 1 (2022) 49-50

Jurnal Teknologi Reaktor Nuklir

Tri Dasa Mega

Journal homepage: jurnal.batan.go.id/index.php/tridam

Acknowledgment

The following Peer Reviewers:

- Prof. Dr. Nandy Putra MSc.
- Prof. Dr. Pande Udiyani, M.Sc.
- Prof. Ir. Syarip.
- Dr. Yus Rusdian Akhmad M.Eng.
- Dr. Julwan Hendry Purba S.T. M.App.IT.
- Dr. M. Budi Setiawan.
- Ir. Sudjatmi K. MT.
- Dr. Topan Setiadipura.
- Ir. Ign. Djoko Irianto M.Eng.
- Dipl. Ing. (FH) Andi Sofrany Ekariansyah
- Dr. Mulya Juarsa, S.Si., MESC

who have been involved in the reviewing of the articles in this issue of Tri Dasa Mega Vol. 24 No. 1 February 2022 are greatly acknowledged.