



Contents

Original Articles

Reactor Physics

- Time-dependent simplified spherical harmonics formulations for a nuclear reactor system
A. Carreño, A. Vidal-Ferràndiz, D. Ginestar and G. Verdú.....3861

Thermal Hydraulics

- Preliminary design and assessment of a heat pipe residual heat removal system for the reactor driven subcritical facility
Wenwen Zhang, Kaichao Sun, Chenglong Wang, Dalin Zhang, Wenxi Tian, Suizheng Qiu and G.H. Su.....3879
- Development of a prediction model relating the two-phase pressure drop in a moisture separator using an air/water test facility
Kihwan Kim, Jae bong Lee, Woo-Shik Kim, Hae-seob Choi and Jong-In Kim.....3892
- Parallelization and application of SACOS for whole core thermal-hydraulic analysis
Minyang Gui, Wenxi Tian, Di Wu, Ronghua Chen, Mingjun Wang and G.H. Su.....3902
- Impact of axial power distribution on thermal-hydraulic characteristics for thermionic reactor
Zhiwen Dai, Chenglong Wang, Dalin Zhang, Wenxi Tian, Suizheng Qiu and G.H. Su.....3910
- Experimental investigation of two-phase natural circulation loop as passive containment cooling system
Sun Taek Lim, Koungh Moon Kim, Haeseong Kim, Dong-Wook Jerng and Ho Seon Ahn.....3918

Nuclear Safety

- Development and validation of fuel stub motion model for the disrupted core of a sodium-cooled fast reactor
Kenichi Kawada and Tohru Suzuki.....3930
- The ensemble approach in comparison with the diverse feature selection techniques for estimating NPPs parameters using the different learning algorithms of the feed-forward neural network
Khalil Moshkbar-Bakhshayesh.....3944
- Immobilization of sodium-salt wastes containing simulated ^{137}Cs by volcanic ash-based ceramics with different Si/Al molar ratios
Xiao-Wen Sun, Li-Ke Liu and Song Chen.....3952
- Validation of the correlation-based aerosol model in the ISFRA sodium-cooled fast reactor safety analysis code
Churl Yoon, Sung Il Kim, Sung Jin Lee, Seok Hun Kang and Chan Y. Paik.....3966
- Magnetic withdrawal of particles for multiple purposes in nuclear power plants
Dong Hoon Kam, Yong Hoon Jeong, Sung-Min Choi and Jong-Il Yun.....3979
- CSPACE for a simulation of core damage progression during severe accidents
JinHo Song, Dong-Gun Son, JunHo Bae, Sung Won Bae, KwangSoon Ha, Bub-Dong Chung and YuJung Choi.....3990
- Debris transport visualization to analyze the flow characteristics in reactor vessel for nuclear power plants
Yong Jae Song, Dong Seok Lim, Min Beom Heo, Beom Kyu Kim, Doo Yong Lee and Daeseong Jo.....4003

Nuclear I&C

- Prediction of golden time for recovering SISs using deep fuzzy neural networks with rule-dropout
Hye Seon Jo, Young Do Koo, Ji Hun Park, Sang Won Oh, Chang-Hwoi Kim and Man Gyun Na.....4014





An International Journal of the Korean Nuclear Society

NUCLEAR ENGINEERING AND TECHNOLOGY

Volume 53, Number 12, December 2021

Contents

Nuclear Fuel and Reactor Materials

- Machine learning modeling of irradiation embrittlement in low alloy steel of nuclear power plants
Gyeong-Geun Lee, Min-Chul Kim and Bong-Sang Lee4022
- Pore structure evolution characteristics of sandstone uranium ore during acid leaching
Sheng Zeng, Yuan Shen, Bing Sun, Ni Zhang, Shuwen Zhang and Song Feng4033
- Multilevel modeling of diametral creep in pressure tubes of Korean CANDU units
Gyeong-Geun Lee, Dong-Hyun Ahn, Hyung-Ha Jin, Myung-Ho Song and Jong Yeob Jung4042
- EBSID studies on microstructure and crystallographic orientation of UO_2 -Mo composite fuels
Murali Krishna Tummalapalli, Jerzy A. Szpunar, Anil Prasad and Lukas Bichler4052
- Pipeline wall thinning rate prediction model based on machine learning
Seongin Moon, Kyungmo Kim, Gyeong-Geun Lee, Yongkyun Yu and Dong-Jin Kim4060

Radiation Application

- Neutron yield and energy spectrum of $^{13}\text{C}(\alpha, n)^{16}\text{O}$ reaction in liquid scintillator of KamLAND:
A Nedis-2m simulation
Gennady N. Vlaskin, Sergey V. Bedenko, Nima Ghal-Eh and Hector R. Vega-Carrillo4067
- A comparative study of machine learning methods for automated identification of radioisotopes using
NaI gamma-ray spectra
S.M. Galib, P.K. Bhowmik, A.V. Avachat and H.K. Lee4072
- Evaluation of sequence tracking methods for Compton cameras based on CdZnTe arrays
Jun Lee, Younghak Kim, Aleksey Bolotnikov and Wonho Lee4080
- A new dead-time determination method for gamma-ray detectors using attenuation law
T. Akyurek4093
- Calculation of Jaws-only IMRT (JO-IMRT) dose distributions based on the AAPM TG-119 test cases using
Monte Carlo simulation and Prowess Panther treatment planning system
Luong Thi Oanh, Duong Thanh Tai, Truong Thi Hong Loan and James CL Chow4098

Radiation Protection

- Effect of rare earth dopants on the radiation shielding properties of barium tellurite glasses
P. Vani, G. Vinitha, M.I. Sayyed, Maha M. AlShammari and N. Manikandan4106
- The status of NORMs in natural environment adjacent to the Rooppur nuclear power plant of
Bangladesh
*Md Abu Haydar, Md Mehade Hasan, Imrose Jahan, Kanij Fatema, Md Idris Ali, Debasish Paul and
Mayeen Uddin Khandaker*4114
- Virtual calibration of whole-body counters to consider the size dependency of counting efficiency using
Monte Carlo simulations
MinSeok Park, Han Sung Kim, Jaeryong Yoo, Chan Hyeong Kim, Won Il Jang and Sunhoo Park4122
- Gadolinium- and lead-containing functional terpolymers for low energy X-ray protection
Yu-Juan Zhang, Xin-Tao Guo, Chun-Hong Wang, Xiang An Lu, De-Feng Wu and Ming Zhang4130
- Radiological analysis of transport and storage container for very low-level liquid radioactive waste
*Seung Hun Shin, Woo Nyun Choi, Seungbin Yoon, Un Jang Lee, Hye Min Park, Seong Hee Park, Youn Jun Kim
and Hee Reyoung Kim*4137



Contents

Comparison of nano/micro lead, bismuth and tungsten on the gamma shielding properties of the flexible composites against photon in wide energy range (40 keV–662 keV) <i>Mansour Asgari, Hossein Afarideh, Hassan Ghafoorifard and Eskandar Asadi Amirabadi</i>	4142
Assessment of supervision monitoring for radiation environment around the typical research reactors in China <i>Sa Li, Haipeng Wang and Yanxia Zhang</i>	4150
Investigation of the suitability of new developed epoxy based-phantom for child's tissue equivalency in paediatric radiology <i>Haluk Yücel and Aziz Safi</i>	4158
Nuclear Structural Analysis and Plant Management & Maintenance	
Analysis and optimization research on latch life of control rod drive mechanism based on approximate model <i>Sitong Ling, Wenqiang Li, Tianda Yu, Qiang Deng and Guozhong Fu</i>	4166
Optimal earthquake intensity measures for probabilistic seismic demand models of ARP1400 reactor containment building <i>Duy-Duan Nguyen, Bidhek Thusa, Md Samdani Azad, Viet-Linh Tran and Tae-Hyung Lee</i>	4179

Technical Note

Radiation Protection

Use of big data for estimation of impacts of meteorological variables on environmental radiation dose on Ulleung Island, Republic of Korea <i>Han Young Joo, Jae Wook Kim, So Yun Jeong, Young Seo Kim and Joo Hyun Moon</i>	4189
---	------

This journal was supported by the Korean Federation of Science and Technology Societies Grant funded by the Korean Government (Ministry of Education).