

Contents

Review Article

Thermal Hydraulics

- Review of researches on coupled system and CFD codes
Jianping Long, Bin Zhang, Bao-Wen Yang, and Sipeng Wang2775

Original Articles

Reactor Physics

- Use of Monte Carlo code MCS for multigroup cross section generation for fast reactor analysis
Tung Dong Cao Nguyen, Hyunsuk Lee, and Deokjung Lee2788
- Uncertainty quantification in decay heat calculation of spent nuclear fuel by STREAM/RAST-K
Jaerim Jang, Chidong Kong, Bamidele Ebiwonjumi, Alexey Cherezov, Yunki Jo, and Deokjung Lee2803
- Uncertainty analyses of spent nuclear fuel decay heat calculations using SCALE modules
Ahmed Shama, Dimitri Rochman, Susanne Pudollek, Stefano Caruso, and Andreas Pautz2816
- Simulation of low-enriched uranium burnup in Russian VVER-1000 reactors with the Serpent Monte-Carlo code
L. Mercatali, N. Beydogan, and V.H. Sanchez-Espinoza2830

Thermal Hydraulics

- A preliminary study on material effects of critical heat flux for downward-facing flow boiling
Kai Wang, Chun-Yen Li, Kotaro Uesugi, Nejdert Erkan, and Koji Okamoto2839
- CFD analysis of the flow blockage in a rectangular fuel assembly of the IAEA 10 MW MTR research reactor
Shuang Xia, Xuhua Zhou, Gaojie Hu, and Xiaxin Cao2847

Nuclear Safety

- Analysis of severe accident progression and Cs behavior for SBO event during mid-loop operation of OPR1000 using MELCOR
Yerim Park, Hoyoung Shin, Seungwoo Kim, Youngho Jin, Dong Ha Kim, and Moosung Jae2859
- Experimental study of sodium fire and its characteristics under the coupling action of columnar liquid sodium flow and concrete
Yan Huo, Gao-Wan Zou, Hui Dong, Jian-Fu Lv, and Jian He2866
- Effect analysis of ISLOCA pathways on fission product release at Westinghouse 2-loop PWR using MELCOR
Seungwoo Kim, Yerim Park, Youngho Jin, Dong Ha Kim, and Moosung Jae2878
- Vital area identification for the physical protection of NPPs in low-power and shutdown operations
Myung Woong Kwak and Woo Sik Jung2888

Nuclear Physics, Fusion, and Laser Technology

- Design of online damage images detection system for large-aperture mirrors of high power laser facility based on wavefront coding technology
Wang Fang, Liu Qinxiao, Hu Dongxia, Liu Hongjie, and Zheng Tianran2899
- Design of muon production target system for the RAON μ SR facility in Korea
Jae Young Jeong, Jae Chang Kim, Yonghyun Kim, Kihong Pak, Kyungmin Kim, Junesic Park, Jaebum Son, Yong Kyun Kim, Wonjun Lee, and Ju Hahn Lee2909



Contents

Nuclear Fuel Cycle and Radioactive Waste Management

- Decontamination of spent ion exchange resins contaminated with iron-oxide deposits using mineral acid solutions
E.A. Tokar, A.I. Matskevich, M.S. Palamarchuk, Yu.A. Parotkina, and A.M. Egorin2918
- Investigation of thorium separation from rare-earth extraction residue via electrosorption with carbon based electrode toward reducing waste volume
Eli Syafiqah Aziman, Aznan Fazli Ismail, Nabilla Abdul Muttalib, and Muhammad Syafiq Hanifah2926

Nuclear Fuel and Reactor Materials

- Thermo-mechanical coupling behavior analysis for a U-10Mo/Al monolithic fuel assembly
Xiaoxiao Mao, Xiaobin Jian, Haoyu Wang, Jingyu Zhang, Jibin Zhang, Feng Yan, Hongyang Wei, Shurong Ding, and Yuanming Li2937
- A practical power law creep modeling of alloy 690 SG tube materials
Bong-Sang Lee, Jong-Min Kim, June-Yeop Kwon, Kwon-Jae Choi, and Min-Chul Kim2953
- A hardening model considering grain size effect for ion-irradiated polycrystals under nanoindentation
Kai Liu, Xiangyun Long, Bochuan Li, Xiazi Xiao, and Chao Jiang2960
- 3D reconstruction of two-phase random heterogeneous material from 2D sections: An approach via genetic algorithms
D. Pizzocri, R. Genoni, F. Antonello, T. Barani, and F. Cappia2968
- Corrosion fatigue crack growth behavior of 316LN stainless steel in high-temperature pressurized water
Ziyu Zhang, Jibo Tan, Xinqiang Wu, En-Hou Han, and Wei Ke2977
- Evaluation of 475 °C embrittlement in UNS S32750 super duplex stainless steel using four-point electric conductivity measurements
Gildardo Gutiérrez-Vargas, Alberto Ruiz, Víctor H. López-Morelos, Jin-Yeon Kim, Jorge González-Sánchez, and Ariosto Medina-Flores2982
- Segmented mandrel tests of as-received and hydrogenated WWER fuel cladding tubes
Márton Király, Márta Horváth, Richárd Nagy, Nóra Vér, and Zoltán Hózer2990
- Flow-accelerated corrosion assessment for SA106 and SA335 pipes with elbows and welds
Dong-Jin Kim, Sung-Woo Kim, Jong Yeon Lee, Kyung Mo Kim, Se Beom Oh, Gyeong Geun Lee, Jongbeom Kim, Seong-Sik Hwang, Min Jae Choi, Yun Soo Lim, Sung Hwan Cho, and Hong Pyo Kim3003

Radiation Application

- Neutron diagnostics using nickel foil activation analysis in the KSTAR
San Chae, Jae-Yong Lee, and Yong-Soo Kim3012
- A feasibility study of using a 3D-printed tumor model scintillator to verify the energy absorbed to a tumor
Tae Hoon Kim, Sangmin Lee, Dong Geon Kim, Jae Young Jeong, Hye Jeong Yang, Thomas Schaarschmidt, Sang Hyoun Choi, Gyu-Seok Cho, Yong Kyun Kim, and Hyun-Tai Chung3018

Radiation Protection

- A design of transmission-type multi-target X-ray tube based on electric field modulation
Lei Zhao, Wenbao Jia, Limin Jin, Qing Shan, Can Cheng, Hongkui Zhu, and Daqian Hei3026
- A preliminary evaluation of the implementation of a radiation protection program for the lens of the eye in Korean nuclear power plants
Tae Young Kong, Si Young Kim, Moonhyung Cho, Yoonhee Jung, Jung Kwon Son, Han Jang, and Hee Geun Kim3035





An International Journal of the Korean Nuclear Society

NUCLEAR ENGINEERING AND TECHNOLOGY

Volume 53, Number 9, September 2021

Contents

Monte Carlo approach for calculation of mass energy absorption coefficients of some amino acids <i>Ahmet Bozkurt and Aycan Sengul</i>	3044
Fabrication, characterization, simulation and experimental studies of the ordinary concrete reinforced with micro and nano lead oxide particles against gamma radiation <i>K. Mokhtari, M. Kheradmand Saadi, H. Ahmadpanahi, and Gh. Jahanfarnia</i>	3051
Experimental investigation of zinc sodium borate glass systems containing barium oxide for gamma radiation shielding applications <i>A. Aboalatta, J. Asad, M. Humaid, H. Musleh, S.K.K. Shaat, Kh Ramadan, M.I. Sayyed, Y. Alajerami, and N. Aldahoudi</i>	3058
Nuclear Structural Analysis and Plant Management & Maintenance	
Damage and vibrations of nuclear power plant buildings subjected to aircraft crash part I: Model test <i>Z.R. Li, Z.C. Li, Z.F. Dong, T. Huang, Y.G. Lu, J.L. Rong, and H. Wu</i>	3068
Damage and vibrations of nuclear power plant buildings subjected to aircraft crash part II: Numerical simulations <i>Z.R. Li, Z.C. Li, Z.F. Dong, T. Huang, Y.G. Lu, J.L. Rong, and H. Wu</i>	3085
Distributed plasticity approach for nonlinear analysis of nuclear power plant equipment: Experimental and numerical studies <i>Thanh-Tuan Tran, Kashif Salman, and Dookie Kim</i>	3100
Studies on the effect of thermal shock on crack resistance of 20MnMoNi55 steel using compact tension specimens <i>K. Thamaraiselvi and S. Vishnuvardhan</i>	3112
Technical Note	
Nuclear Safety	
Signal processing method of bubble detection in sodium flow based on inverse Fourier transform to calculate energy ratio <i>Wei Xu, Ke-Jun Xu, Xin-Long Yu, Ya Huang, and Wen-Kai Wu</i>	3122

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

