

KERNTECHNIK

INDEPENDENT JOURNAL FOR NUCLEAR ENGINEERING

ENERGY SYSTEMS – RADIATION – RADIOLOGICAL PROTECTION

EDITOR-IN-CHIEF

Anne Krüssenberg, Neufahrn, Germany

EDITORIAL BOARD

Frank Apel, Heidelberg, Germany

Attila Aszódi, Budapest, Hungary

Xu Cheng, Karlsruhe, Germany

Yuri Kazansky, Obninsk, Russian Federation

Sören Kliem, Dresden, Germany

Horst-Michael Prasser, Zurich, Switzerland

Piero Ravetto, Torino, Italy

Andreas Schaffrath, Garching near Munich, Germany

Chul-Hwa Song, Daejeon, South Korea

Frank-Peter Weiß, Dresden, Germany

DE GRUYTER

ABSTRACTED/INDEXED IN Astrophysics Data System (ADS) · Baidu Scholar · CNKI Scholar (China National Knowledge Infrastructure) · CNPIEC: cnpLINKer · Dimensions · EBSCO Discovery Service · Google Scholar · J-Gate · Journal Citation Reports/Science Edition · MyScienceWork · Naver Academic · Naviga (Softweco) · Primo Central (ExLibris) · ReadCube · ScienceON (Korea Institute of Science and Technology Information) · Scilit · SCImago (SJR) · SCOPUS · Semantic Scholar · Sherpa/RoMEO · Summon (ProQuest) · TDNet · WanFang Data · Web of Science: Current Contents/Engineering, Computing, and Technology; Science Citation Index Expanded · WorldCat (OCLC) · X-MOL · Yewno Discover

The publisher, together with the authors and editors, has taken great pains to ensure that all information presented in this work (programs, applications, amounts, dosages, etc.) reflects the standard of knowledge at the time of publication. Despite careful manuscript preparation and proof correction, errors can nevertheless occur. Authors, editors and publisher disclaim all responsibility for any errors or omissions or liability for the results obtained from use of the information, or parts thereof, contained in this work. The citation of registered names, trade names, trademarks, etc. in this work does not imply, even in the absence of a specific statement, that such names are exempt from laws and regulations protecting trademarks etc. and therefore free for general use.

ISSN 0932-3902 · e-ISSN 2195-8580

All information regarding notes for contributors, subscriptions, Open access, back volumes and orders is available online at www.degruyter.com/kern.

EDITOR-IN-CHIEF Dr.-Ing. Anne Krüßenberg, Hirtenweg 33b, 85375 Neufahrn, Germany,
Tel.: +49 (0)163 9866013, e-mail: kerntechnik@degruyter.com

PUBLISHER Walter de Gruyter GmbH, Berlin/Boston, Genthiner Straße 13, 10785 Berlin, Germany

JOURNAL COORDINATOR Anne Weberling, De Gruyter, Genthiner Straße 13, 10785 Berlin, Germany,
Tel.: +49 (0)30 260 05-421, Fax: +49 (0)30 260 05-250, e-mail: anne.weberling@degruyter.com

RESPONSIBLE FOR ADVERTISEMENTS Markus Kügel, De Gruyter, Neumarkter Straße 28, 81673 Munich, Germany.
Tel.: +49 (0) 89 76 902-424, e-mail: anzeigen@degruyter.com

© 2024 Walter de Gruyter GmbH, Berlin/Boston, Germany

TYPESETTING TNQ Tech Private Limited, Chennai, India

PRINTING Franz X. Stückle Druck und Verlag e.K., Ettenheim, Germany



Contents

Thiagarajan Chenniappan and Yuvarajan Devarajan
Comprehensive review of surface contamination in nuclear waste waters: identification, quantification, and mitigation strategies — 549

Manorma Kumar and Guillem Cortes-Rossell
Methodology of probabilistic safety assessment for transportation of radioactive material — 558

Ji Su Kang and Jae Hak Cheong
A new approach to determine abnormality of radioactive discharges from pressurized water reactors and to derive abnormality indicators correlated with a specific causal event — 567

Thiagarajan Chenniappan and Yuvarajan Devarajan
A critical analysis of the role of artificial intelligence and machine learning in enhancing nuclear waste management — 586

Jean Pierre Ndayiragije, Zaki Su'ud, Abdul Waris and Dwi Irwanto
Design study of gas-cooled fast reactor with natural uranium as fuel employing modified CANDU shuffling strategy in the axial direction — 595

Zaihong Wang, Yongheng Lu, Zhenfang Cai, Yabin He and Yiqiang Sun
Synthesis, structural transformation and magnetic properties of the Nd(III)-doped $\text{Fe}_{3-x}\text{Nd}_x\text{O}_4$ ($0 \leq x \leq 0.9$): an analogue for actinides immobilization — 606

Amr Ibrahim
Examination of the use of thorium-based fuel for burning minor actinides in European sodium cooled fast reactor — 614

Seyede Nasrin Hosseini-motlagh, Abuzar Shakeri, Mohammad Ali Zarei, Jahangir Bayat, Kavous Abbasi, Vahid Reza Rezaei, Ehsan Rasti, Ali Ghasempour Nesheli and Hamid Reza Vanaei
Solitary wave form of reaction rate in graphite diffusive medium using different neutron absorbers — 624

Elena D. Morlova and Daniela Mladin
Evaluation of the unavailability of the primary circuit of Triga SSR reactor, importance factors and risk criteria for its components — 632

Salah El-Din El-Morshedy, Mohamed Moawed, Mohamed A. Abdelrahman, Asmaa G. Abu Elnour and Mohammed Taha
Thermal-hydraulic simulation of loss of flow accident for WWR-S research reactor — 644

Zi-Yi Yang, Pei-Chieh Huang and Yu Chiang
A quick parameter configuration tool for SCHISM's ocean transport simulation of radioactive materials — 658

Avinash J. Gaikwad, Naresh K. Maheshwari and Naveen Kumar
Main heat transport system configuration influence on steam drum level control and safety for a pressure tube type boiling water reactor with multiple interconnected loops — 667

Salah El-Din El-Morshedy and Loula Shouman
Testing the thermal performance of water cooling towers — 683

Afaf A.E. Ateya, Rehab M. Saeed and Magy M. Kandil
Design a robust intelligent power controller for pressurized water reactor using particle swarm optimization algorithm — 690

Calendar of events — 699