

Special issue featuring papers from the 25th Topical Meeting on the Technology of Fusion Energy (TOFE 2022)

Contents

- v Foreword
Arkady Serikov

RESEARCH ARTICLES

Neutronics of Fusion Devices

- 919** Managing Fusion Radioactive Materials: Approaches and Challenges Facing Fusion in the 21st Century
Laila El-Guebaly
- 932** Consequences of Neutron Energy Spectrum on Radiation Damage, Gas Production, and Transmutations in Fusion Materials
Laila El-Guebaly, Mohamed Sawan
- 941** Relevance of Tritium Breeder Irradiation Testing in a Fusion Prototypic Neutron Source
Chase N. Taylor, Matthew D. Eklund, Thomas F. Fuerst, Masashi Shimada, Paul W. Humrickhouse, Tim Bohm
- 952** Use of LANSCE Spallation Neutrons to Drive a Fusion Prototypic Neutron Source
Eric J. Pitcher, Yuri K. Batygin, Charles T. Kelsey IV, Stuart A. Maloy, Eric R. Olivas, Keith A. Woloshun
- 961** Tritium Breeding Ratio Evaluation of Solid Breeder Concepts for the FESS-FNSF
Felipe S. Novais, Nicholas R. Brown, G. Ivan Maldonado
- 973** Activation Analysis for the Inboard Region of FNSF Using SERPENT
Son N. Quang, Jonathan Wing, Nicholas R. Brown, G. Ivan Maldonado
- 989** Radiation Damage Analysis of FNSF Components Using McCad and MCNP
Marina Rizk, Felipe S. Novais, Nicholas R. Brown, G. Ivan Maldonado
- 995** Initial Neutronics Investigation of a Chlorine Salt–Based Breeder Blanket
Tim D. Bohm, Ben A. Lindley

—continued—

Contents continued

VOLUME 79 · NUMBER 8 · NOVEMBER 2023

- 1008** Advancing Methods for Fusion Neutronics: An Overview of Workflows and Nuclear Analysis Activities at UKAEA

Alex Valentine, Thomas Berry, Steven Bradnam, Hari Chohan, Tim Eade, Callum Grove, James Hagues, Keir Hearn, James Hodson, Kimberley Lennon, Jonathan Naish, Joseph Neilson, Chantal Nobs, Lee Packer, Andrew Turner, Anthony Turner, Luke Woodall, Ross Worrall

- 1023** A Safer, Smaller, Cleaner Subcritical Thorium Fission—Muonic Fusion Hybrid Reactor
A. Iiyoshi, N. Kobayashi, T. Mutoh, S. Nakatani, S. Okada, M. Sato, H. Takano, Y. Tanahashi, N. Yamamoto, A. Fujita, Y. Kino

Design Development of Fusion Research Facilities

- 1039** CHIMERA Fusion Technology Facility: Testing and Virtual Qualification
Thomas R. Barrett, M. Bamford, N. Bowden, B. Chuilon, T. Deighan, P. Efthymiou, M. Gorley, T. Grant, D. Horsley, M. Kovari, M. Tindall

- 1051** Engineering Paradigms for Sheared-Flow-Stabilized Z-Pinch Fusion Energy
M. C. Thompson, B. Levitt, B. A. Nelson, U. Shumlak

- 1059** UNITY: Kyoto Fusionneering's Unique Integrated Testing Facility for Fusion Power Generation
Shutaro Takeda, Satoshi Ogawa, Masato Tabuchi, Yoshifumi Kume, Richard Pearson, Colin Baus, Satoshi Konishi, Kyoto Fusionneering UNITY Team

- 1065** Initial Commissioning Test Results of the Wendelstein 7-X Continuous Pellet Fueling System
S. J. Meitner, L. R. Baylor

Modeling and Simulations

- 1071** Bayesian Parameter Estimation of the k - ω Shear Stress Transport Model for Accurate Simulations of Impinging-Jet Heat Transfer
Michael L. Lanahan, Said I. Abdel-Khalik, Minami Yoda

- 1082** ORNL Progress in Disruption Mitigation Technology in Support of ITER
L. R. Baylor, T. E. Gebhart, S. J. Meitner, D. A. Rasmussen, C. Barbier, S. K. Combs, N. Commaux, P. W. Fisher, M. J. Gouge, T. C. Jernigan

- 1092** Three-Dimensional Electromagnetic and Structural Analysis of Disruptions in the COMPASS Upgrade Vacuum Vessel
Arthur Brooks, Chirag Rana, Jakub Hromadka, Jan Prevratil, Karel Patocka, Josef Havlicek, Radomir Panek

—continued—

Contents continued

VOLUME 79 · NUMBER 8 · NOVEMBER 2023

Plasma-Facing Components and Plasma–Material Interactions

- 1099** Overview of Liquid-Metal PFC R&D at the University of Illinois Urbana-Champaign
D. Andruczyk, R. Rizkallah, D. O’Dea, A. Shone, S. Smith, B. Kamiyama, R. Maingi, C. E. Kessel, S. Smolentsev, T. W. Morgan, F. Romano
- 1113** Final Design of the Material Plasma Exposure eXperiment
J. Rapp, A. Lumsdaine, A. Aaron, T. M. Biewer, T. S. Bigelow, T. Boyd, J. B. O. Caughman, D. Curry, R. C. Duckworth, R. H. Goulding, A. Hussain, M. Kaufman, C. H. Lau
- 1124** Material Plasma Exposure eXperiment High Heat Flux Microwave Absorber Design, Manufacture, and Articles Test
A. Hussain, V. Rao, N. Branch, T. Gray, A. Kubik, A. Aaron, K. Logan, S. Stewart, A. Lumsdaine, G. S. Showers, R. L. Romesberg, D. E. Wolfe
- 1149** Thermohydraulic Design Analysis of the Target Assembly in the Material Plasma Exposure eXperiment Facility
Adrian S. Sabau, Aftab Hussain, Federico Gallo, Adam M. Aaron
- 1178** Final Design of Vacuum Pumping Systems for the Material Plasma Exposure eXperiment
Jonathan Perry, Adam Aaron, Chris Stone, Arnold Lumsdaine

Breeding Blanket Technology and Tritium Transport

- 1187** Qualification and Commissioning of Helium Flow Loop Experiment for Blanket Design Measurements
Cody S. Wiggins, Dennis L. Youchison, Fayaz Rasheed, Charles Kessel, Monica Gehrig, Michael Harper, Adam Carroll, Dean McGinnis, Michael Morrow, Chase Joslin
- 1197** Tritium Transport in WCLL Outboard Breeding Blanket of EU-DEMO Reactor Under Pulsed Plasma Operation
Luigi Candido, Ciro Alberghi, Pietro Arena, Fabio Moro, Simone Noce, Marco Utili, Massimo Zucchetti
- 1208** Modeling of the HCPB Helium Coolant Purification System for EU-DEMO: Process Simulations of Molecular Sieves and NEG Sorbents
Jonas C. Schwenzer, Alessia Santucci, Christian Day

—continued—

Contents continued

VOLUME 79 · NUMBER 8 · NOVEMBER 2023

- 1219** Influence of Microstructure on the Absorption of Tritium into Gold-Plated 316 Stainless Steel
M. Sharpe, W. T. Shmayda
- 1224** Parametric Study of the Vacuum Permeator for the Tritium Extraction eXperiment
*Thomas F. Fuerst, Matthew D. Eklund, John A. Leland, Adriaan A. Riet,
Chase N. Taylor*