

Fusion technology

**CONTENTS / MARCH 2001—VOL. 39, NO. 2,
PART 2 (pp. 291–1166)**

**Proceedings of the
FOURTEENTH TOPICAL MEETING ON THE
TECHNOLOGY OF FUSION ENERGY
Park City, Utah
October 15–19, 2000**

xiii Comments / *Nermin A. Uckan*

xv Preface / *Glen Longhurst*

FUSION TECHNOLOGY PLENARY

- 293** Japanese Fusion Program and ITER / *Nobuyuki Inoue*
- 298** Status of Fusion Technology Activities in Japan / *Satoru Tanaka*
- 305** Recent Findings in DIII-D Relative to Advanced Tokamak Modes and Their Implications for Fusion Energy / *P. I. Petersen, DIII-D Team*
- 315** Progress in Steady-State High Performance and Related Technologies in the JT-60U Tokamak / *Kenkichi Ushigusa, JT-60 Team*
- 322** Recent Results from the Large Helical Device / *O. Kaneko, K. Kawahata, A. Komori, N. Ohyabu, H. Yamada, N. Ashikawa, P. deVries, M. Emoto, H. Funaba, M. Goto, K. Ida, H. Idei, K. Ikeda, S. Inagaki, N. Inoue, M. Isobe, S. Kado, K. Khlopchenov, S. Kubo, R. Kumazawa, S. Masuzaki, T. Minami, J. Miyazawa, T. Morisaki, S. Morita, S. Murakami, S. Muto, T. Mutoh, Y. Nagayama, N. Nakajima, Y. Nakamura, H. Nakanishi, K. Narihara, K. Nishimura, N. Noda, T. Notake, T. Kobuchi, Y. Liang, S. Ohdachi, Y. Oka, M. Osakabe, T. Ozaki, R. O. Pavlichenko, B. J. Peterson, A. Sagara, K. Saito, S. Sakakibara, R. Sakamoto, H. Sasao, M. Sasao, K. Sato, M. Sato, T. Seki, T. Shimozuma, M. Shoji, H. Sugama, H. Suzuki, M. Takechi, Y. Takeiri, N. Tamura, K. Tanaka, K. Toi, T. Tokuzawa, Y. Torii, K. Tsumori, I. Yamada, S. Yamaguchi, S. Yamamoto, M. Yokoyama, Y. Yoshimura, K. Y. Watanabe, T. Watari, K. Itoh, K. Matsuoka, K. Ohkubo, I. Ohtake, S. Satoh, T. Satow, S. Sudo, S. Tanahashi, K. Yamazaki, Y. Hamada, O. Motojima, M. Fujiwara*
- 329** The National Ignition Facility Project: An Update / *W. J. Hogan, E. Moses, B. Warner, M. Sorem, J. Soures, J. Hands*
- 336** Fusion Ignition Research Experiment (FIRE) / *Dale M. Meade*
- 343** ARIES Inertial Fusion Chamber Assessment / *M. S. Tillack, F. Najmabadi, L. A. El-Guebaly, R. R. Peterson, D. T. Goodin, K. R. Schultz, W. R. Meier, J. Perkins, D. A. Petti, J. D. Sethian, L. M. Waganer*
- 350** Overview of International Waste Management Activities in Fusion / *Neill P. Taylor, Edward T. Cheng, David A. Petti, Massimo Zucchetti*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

ADVANCED DESIGNS

- 359** First Test Results on ITER CS Model Coil and CS Insert / *N. Martovetsky, P. Michael, J. Minervini, A. Radovinsky, M. Takayasu, R. Thome, T. Ando, T. Isono, T. Kato, H. Nakajima, G. Nishijima, Y. Nunoya, M. Sugimoto, Y. Takahashi, H. Tsuji, D. Bessette, K. Okuno, M. Ricci, R. Maix*
- 367** Fusion Technology Development for ITER in JAERI / *Masahiro Seki, Hiroshi Tsuji, Yoshihiro Ohara, Masato Akiba, Yoshikazu Okumura, Tsuyoshi Imai, Masataka Nishi, Kohichi Koizumi, Hiroshi Takeuchi*
- 374** Engineering Status of the Fusion Ignition Research Experiment (FIRE) / *Philip J. Heitzenroeder, Dale M. Meade, Richard J. Thome*
- 378** Design of the Fusion Ignition Research Experiment (FIRE) Plasma Facing Components / *M. A. Ulrickson, C. Baxi, J. Brooks, D. Driemeyer, A. Hassenein, C. E. Kessel, B. E. Nelson, T. Rognlein, J. C. Wesley*
- 383** Fusion Ignition Research Experiment (FIRE) Magnet System Structural Analyses / *Peter H. Titus*
- 389** Fusion Ignition Research Experiment System Integration / *T. Brown*
- 393** Nuclear Analysis of the FIRE Ignition Device / *M. E. Savan, H. Y. Khater*
- 398** Physics Design Guidelines for Estimating Plasma Performance in a Burning Plasma Experiment (FIRE) / *Nermin A. Uckan, John C. Wesley*
- 403** Burning Plasma Physics Issues Illustrated by Simulations of FIRE / *W. A. Houlberg*
- 408** Thermal Hydraulic Analysis of FIRE Divertor / *C. B. Baxi, M. A. Ulrickson, D. E. Driemeyer, P. Heitzenroeder*
- 412** Fusion Ignition Research Experiment Vacuum Vessel Design and Configuration / *B. Nelson, T. Burgess, T. Brown, H.-M. Fan, P. Heitzenroeder*
- 417** FIRE Facilities and Site Requirements / *David A. Dilling, Tom Brown*
- 422** Electric Power Supply Options for FIRE / *C. Neumeyer, R. Woolley*
- 429** ARIES-AT Blanket and Divertor / *A. R. Raffray, M. S. Tillack, X. Wang, L. El-Guebaly, I. Sviatoslavsky, S. Malang*
- 434** Electromagnetic Disruption Effects in the ARIES-RS Tokamak Design / *Jeffrey A. Crowell, James P. Blanchard*
- 439** Systems Context of the ARIES-AT Conceptual Fusion Power Plant / *Ronald L. Miller, ARIES Team*
- 444** Activation, Decay Heat, and Waste Disposal Analyses for the ARIES-AT Power Plant / *D. Henderson, L. El-Guebaly, P. Wilson, A. Abdou, ARIES Team*
- 449** Safety and Environment Assessment of ARIES-AT / *D. A. Petti, B. J. Merrill, R. L. Moore, G. R. Longhurst, L. El-Guebaly, E. Mogahed, D. Henderson, P. Wilson, A. Abdou*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 458 Comparing Maintenance Approaches for Tokamak Fusion Power Plants / *Lester M. Waganer*
462 Loss of Coolant Accident and Loss of Flow Accident Analysis of the ARIES-AT Design / *E. A. Mogahed, L. El-Guebaly, A. Abdou, P. Wilson, D. Henderson, ARIES Team*

ALTERNATE AND ADVANCED CONCEPTS

- 469 National Spherical Torus Experiment (NSTX) Engineering Overview and Research Results 1999–2000 / *C. Neumeyer, NSTX Team*
473 Critical Technology Issues and Development Requirements for a Fusion Development Facility / *John C. Wesley, Ronald D. Stambaugh*
480 New Opportunities for Fusion in the 21st Century—Advanced Fuels / *Gerald L. Kulcinski, John F. Santarius*
486 Measurements of Plasma Core Properties in an Inertial-Electrostatic Confinement Fusion Device / *K. Yoshikawa, K. Takiyama, K. Masuda, H. Toku, T. Koyama, K. Taruya, H. Hashimoto, A. Nagafuchi, T. Mizutani, Y. Yamamoto, M. Ohnishi, H. Horiike, N. Inoue*
492 Neutron Production and Ionization Efficiency in a Gridded IEC Device at High Currents / *J. H. Nadler, G. H. Miley, H. Momoto, Y. Shaban, Y. Nam, M. Coventry*
498 Virtual Cathode in a Spherical Inertial Electrostatic Confinement Device / *Hiromu Momota, George H. Miley*

FUSION ECONOMIC STUDIES

- 507 The Potential for Fusion Power to Mitigate U.S. Greenhouse Gas Emissions / *Paul J. Meier, Gerald L. Kulcinski*
513 U.S. Fusion Energy Future / *John A. Schmidt, Scott Larson, Maria Pueyo, Paul H. Rutherford, D. L. Jassby*
518 Maximum Implementation Capacity of Fusion Power Reactors / *Yoshiyuki Asaoka, Kunihiko Okano, Tomoaki Yoshida, Ryouji Hiwatari, Koji Tokimatsu*

NONELECTRIC APPLICATIONS

- 525 Tokamak Transmutation Facility Studies / *W. M. Stacey, E. A. Hoffman*
530 A Flibe Based Actinide Transmutation Blanket / *E. T. Cheng*
535 Flibe Blanket Concept for Transmuting Transuranic Elements and Long Lived Fission Products / *Yousrif Gohar*
541 Study of a Lead-Bismuth Cooled Fusion Blanket for Burning Transuranic Actinides / *E. T. Cheng*
546 Steady-State D³He Proton Production in an IEC Fusion Device / *R. P. Ashley, G. L. Kulcinski, J. F. Santarius, S. Krupakar Murali, G. Piefer, R. Radel*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 552 Preliminary Results of Cylindrical Electrostatic Confinement Experiment / *Yu Iwamoto, Takayuki Shirouzu, Yasushi Yamamoto, Nobuyuki Inoue*
- 557 Effects of Electrode Shape on Fusion Reaction Rate in a Cylindrical Electrostatic Confinement Device / *Yasushi Yamamoto, Ryousuke Kusaba, Takayuki Shirouzu, Nobuyuki Inoue*
- 562 Identification of D-D Fusion Reaction by Simultaneous Neutron and Proton Measurements in an Inertial Electrostatic Confinement Fusion Device / *K. Masuda, K. Taruya, T. Koyama, H. Hashimoto, K. Yoshikawa, H. Toku, Y. Yamamoto, M. Ohnishi, H. Horike, N. Inoue*

FUSION MATERIALS

- 569 Mechanical Characterization of Two Low-Activation Chromium Alloys in As-Received and Heat-Treated Conditions / *Enrico Lucon, Eric van Walle, Marc Decréton*
- 574 Si Displacement Cascades Revealed by Atomic-Scale Simulations in 3C-SiC / *Fei Gao, Ram Devanathan, William J. Weber*
- 579 Multiscale Modeling of Radiation Damage of Metals and SiC in Inertial Fusion Reactors / *J. M. Perlado, E. Domínguez, D. Lodi, L. Malerba, J. Marian, J. Prieto, M. Salvador, T. Díaz de la Rubia, E. Alonso, M. J. Caturla, L. Colombo*
- 585 Effect of Helium on Grain Boundary Segregation of Austenitic Stainless Steel After Proton Irradiation / *Kusuma Dewi, Akira Hasagawa, Satoshi Otsuka, Katsunori Abe*
- 590 Tritium and Decay Helium Effects on Cracking Thresholds and Velocities in Stainless Steel / *Michael J. Morgan, Michael H. Tosten*
- 596 Development of Deformation Instability During the Low Cycle Fatigue Testing of F82H Steel in High Temperature Water / *Marie-Françoise Maday*
- 602 Effect of Neutron Irradiation on Mechanical Properties of Cu-Alloy/SS316 Joints / *Hirokazu Yamada, Kunihiko Tsuchiya, Masaru Nakamichi, Hiroshi Kawamura*
- 607 Effect of Interfacial Strength of SiC/SiC Composites Fabricated by Hot-Pressing and Chemical Vapor Infiltration Method on Their Mechanical Properties / *Katsumi Yoshida, Toyohiko Yano, Takayoshi Iseki*
- 612 Effective Thermal Conductivity Measurement of the Candidate Ceramic Breeder Pebble Beds by the Hot Wire Method / *Mikio Enoda, Yoshihiro Ohara, Nicole Roux, Alice Ying, Giovanni Pizza, Siegfried Malang*
- 617 Effects of Thermal Expansion Mismatch on Solid Breeder Blanket Pebble Bed and Structural Clad Thermomechanics Interactions / *A. Y. Ying, H. Huang, M. A. Abdou, L. Zi*
- 624 Characterization of TiO₂-Doped Li₂TiO₃ / *Kunihiko Tsuchiya, Hiroshi Kawamura*
- 629 UPS Study on Adsorption Behavior of H₂O on Li₂O Surface / *Hisashi Tanigawa, Satoru Tanaka*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 634** Correlation Between Tritium Release and Thermal Annealing of Damages in Neutron-Irradiated Li_4SiO_4 / *Y. Morimoto, S. Akahori, A. Shimada, K. Iguchi, K. Okuno, M. Nishikawa, K. Munakata, A. Baba, T. Kawagoe, H. Moriyama, K. Kawamoto, M. Okada*
- 639** A Helium Cooled Li_2O Straight Tube Blanket Design for Cylindrical Geometry / *E. A. Mogahed, H. Y. Khater, J. F. Santarius*
- 644** Optimization of the Filling for the Improvement of the Performance of Reference ITER/DEMO Ceramic and Beryllium Pebble Beds / *G. Dell'Orco, M. Simoncini, D. Zito, G. Vella*
- 649** Compatibility Test of SiC/SiC Composite Materials and AlN with Liquid Li and $\text{Li}_{17}\text{Pb}_{83}$ / *Toshiharu Sakurai, Toshiaki Yoneoka, Satoru Tanaka, Akihiro Suzuki, Takeo Muroga*
- 654** Preliminary Characterization on Li Isotope Separation with Li Ionic Conductors / *Miki Umeda, Kunihiko Tuchiya, Hiroshi Kawamura, Yoshio Hasegawa, Yoshiyasu Nanjo*
- 659** Fabrication of High-Purity V-4Cr-4Ti Low Activation Alloy Products / *Takuya Nagasaka, Takeo Muroga, Motoaki Imamura, Shigeki Tomiyama, Masafumi Sakata*
- 664** Comparison of Impact Property of Japanese and US Reference Heats of V-4Cr-4Ti After Gas-Tungsten-Arc Welding / *Takuya Nagasaka, Martin L. Grossbeck, Takeo Muroga, James F. King*

CHAMBER TECHNOLOGY

- 671** An Engineering Test Facility for Heavy Ion Fusion—Options and Scaling / *W. R. Meier, D. A. Callahan-Miller, J. F. Latkowski, B. G. Logan, J. D. Lindl, P. F. Peterson*
- 678** Design of an Inertial Fusion Energy Target Tracking and Position Prediction System / *Ronald W. Petzoldt, Michael Cherry, Neil B. Alexander, Daniel T. Goodin, Gottfried E. Besenbruch, Ken R. Schultz*
- 684** Concepts for Fabrication of Inertial Fusion Energy Targets / *A. Nobile, P. Gobby, A. M. Schwendt, W. P. Steckle, J. K. Hoffer, D. T. Goodin, G. E. Besenbruch, K. R. Schultz*
- 692** Effect of Temperature and Density Profiles on the Stopping Power of Heavy Ions in IFE Targets / *Martin Nieto, George H. Miley*
- 697** Exploration of the Fundamental "Damage Limit" Light Flux for Grazing Incidence Liquid Metal Mirrors / *Sandy Quan, Neil B. Morley, Mohamed A. Abdou*
- 702** Design Methods for Thick-Liquid Protection of Inertial Fusion Chambers / *P. F. Peterson*
- 711** Description of a Facility for Vapor Clearing Rates Studies of IFE Reactors Flibe Liquid Chambers / *Patrick Calderoni, Alice Ying, Tom Sketchley, Mohamed Abdou*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 716 Dynamics of Oscillating Turbulent Liquid Sheets / *Lance C. Elwell, Dennis L. Sadowski, Minami Yoda, Said I. Abdel-Khalik*
- 721 Direct Measurements of Free Surface Smoothness in Turbulent Liquid Sheets / *Justin A. Collins, Minami Yoda, Said I. Abdel-Khalik*
- 726 Partial Pocket Experiments for IFE Thick-Liquid Pocket Disruption and Clearing / *S. Pemberton, C. Jantzen, J. Kuhn, P. F. Peterson*
- 732 Cylindrical Liquid Jet Grids for Beam-Port Protection of Thick-Liquid Heavy-Ion Fusion Target Chambers / *R. Abbott, S. Pemberton, P. F. Peterson, G.-P. Sun, P. Wright, R. Holmes, J. Latkowski, R. Moir, K. Springer*
- 739 MHD and Heat Transfer Issues and Characteristics for Li Free Surface Flows Under NSTX Conditions / *A. Y. Ying, M. Abdou, S. Smolentsev, H. Huang, R. Kaita, R. Maingi, N. Morley, B. Nelson, T. Sketchley, M. Ullrickson, R. Woolley*
- 746 Flibe Assessments / *Dai-Kai Sze, Kathryn McCarthy, Mohamed Sawan, Mark Tillack, Alice Ying, Steve Zinkle*
- 753 Studies on Flibe Blanket Designs in Helical Reactor FFHR / *Akio Sagara, Hirokuni Yamanishi, Tatsuhiko Uda, Osamu Motojima, Tomoaki Kunugi, Youji Matsumoto, Yican Wu, Hideki Matsui, Shintaro Takahasi, Takuya Yamamoto, Saburo Toda, Osamu Mitarai, Shin-Ichi Satake, Takayuki Terai, Satoru Tanaka, Satoshi Fukada, Masabumi Nishikawa, Akihiko Shimizu, Naoaki Yoshida*
- 758 Thick Liquid-Walled, Field-Reversed Configuration-Magnetic Fusion Power Plant / *R. W. Moir, R. H. Bulmer, K. Gulec, P. Fogarty, B. Nelson, M. Ohnishi, M. Rensink, T. D. Rognlien, J. F. Santarius, D. K. Sze*
- 768 Tritium Release from Li_2BeF_4 Molten Salt Breeder Under Neutron Irradiation at Elevated Temperature / *Takayuki Terai, Akihiro Suzuki, Satoru Tanaka*
- 773 Design of the FLIQURE Experiment / *J. W. Sterbentz, J. E. O'Brien, R. A. Anderl, G. R. Smolik, D. A. Petti, K. A. McCarthy*
- 779 Heat Transfer Enhancement for a Molten Salt Flibe Channel / *Shinya Chiba, Saburo Toda, Kazuhisa Yuki, Akio Sagara*
- 784 Compatibility of Structural Materials with Li_2BeF_4 Molten Salt Breeder / *T. Terai, H. Nishimura, K. Yamaguchi, M. Yamawaki, A. Suzuki, T. Muroga, A. Sagara, O. Motojima*
- 789 Impact of Transmutations in Fusion Environment on Flibe Chemistry / *Dai-Kai Sze, Mohamed E. Sawan, Edward T. Cheng*
- 793 Neutronics Performance Characteristics of the High Power Density EVOLVE First Wall/Blanket System / *M. E. Sawan*
- 798 Heavy-Ion Fusion Final Focus Magnet Shielding Designs / *J. F. Latkowski, W. R. Meier*
- 804 Plasma Stabilization Conducting Shells and Their Impact on TBR and Activation in CLIFF Design / *Mahmoud Z. Youssef, Hesham Khater, Mike Kotschenreuther*
- 810 EVOLVE Lithium Tray Thermal-Hydraulic Analysis / *M. H. Anderson, J. G. Murphy, M. E. Sawan, I. N. Sviatoslavsky, M. L. Corradini, S. Malang*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 815 Evaluation of the Tungsten Alloy Vaporizing Lithium First Wall and Blanket Concept / *C. P. C. Wong, L. Barleon, M. Corradini, P. Fogarty, N. Ghoniem, S. Majumdar, S. Malang, R. Mattas, K. McCarthy, B. Merrill, J. Murphy, B. Nelson, R. Nygren, M. Sawan, S. Sharafat, I. Sviatoslavsky, S. Zinkle*
- 823 An Assessment of the Brayton Cycle for High Performance Power Plants / *R. Schleicher, A. R. Raffray, C. P. Wong*
- 828 Shock Loading of IFE Reactor Cooling Tubes / *M. H. Anderson, J. G. Oakley, M. A. Coil, R. Bonazza, R. R. Peterson*
- 834 Linked Neutronics and Hydrodynamics Calculations for the Z-Pinch Driven Target of X-1 / *M. E. Sawan, R. R. Peterson*
- 839 Nuclear Performance of the Thin-Liquid FW Concept of the CliFF Design / *Mahmoud Z. Youssef, Neil B. Morley, Dai-Kai Sze*

DIVERTOR AND PLASMA-FACING COMPONENTS

- 849 Modeling the Nukiyama Curve for Water-Cooled Fusion Divertor Channels / *Theron D. Marshall, Dennis L. Youchison, Lee C. Cadwallader*
- 856 Measurements of Three-Dimensional, Local Subcooled Flow Boiling Heat Flux and Related Critical Heat Flux for PFCs / *Ronald D. Boyd, Penrose Cofie, Ali Ekhlassi*
- 863 Enhanced Surface Heat Removal Using a Porous Tungsten Heat Exchanger / *S. Sharafat, M. Demetriou, N. Ghoniem, B. Williams, R. Nygren*
- 868 Analysis of Thermal Desorption Spectra to Understand the Migration of Hydrogen in Tungsten / *T. J. Venhaus, R. A. Causey*
- 874 TMAP2000: An Improved Code for Tritium Calculations / *Glen R. Longhurst, Brad J. Merrill*
- 880 Theoretical Investigation of Liquid Metal MHD Free Surface Flows for ALPS / *S. Molokov, I. Cox, C. B. Reed*
- 885 Critical Heat Flux in Subcooled Water Flow in a Saw-Toothed Finned Duct Under One-Sided Heating Conditions / *Koichiro Ezato, Satoshi Suzuki, Kazuyoshi Sato, Masaki Taniguchi, Masato Akiba*
- 890 Disruption Erosion Tests on La₂O₃ Containing Tungsten Material / *Masaki Taniguchi, Kazuyuki Nakamura, Kazuyoshi Sato, Koichiro Ezato, Kenji Yokoyama, Masato Akiba*
- 894 The Effect of Annealing on the Transient Deuterium Permeation Characteristics of Tungsten / *Hirofumi Nakamura, Takumi Hayashi, Yasunori Iwai, Masataka Nishi*
- 899 Thermal Performance of a Dual-Channel, Helium-Cooled, Tungsten Heat Exchanger / *Dennis L. Youchison, Mark T. North*
- 905 Chemical Behavior of Energetic Deuterium Implanted into SiC, Si and Graphite / *K. Iguchi, Y. Morimoto, T. Sugiyama, S. Akahori, K. Okuno, H. Nakamura, M. Nishi*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 910 Vacuum Arc-Deposited Boron Carbide Films for Fusion Plasma Facing Components / *C. C. Klepper, J. Niemel, R. C. Hazelton, E. J. Yadlowsky, O. R. Monteiro*
- 916 Implications of Recent DIII-D Experiments on Plasma Shaping for Future Tokamak Designs / *T. W. Petrie, M. E. Fenstermacher, C. J. Lasnier*
- 923 JT-60SU Divertor Conceptual Design / *M. E. Friend, C. B. Baxi, S. Ishida, G. Kurita, E. E. Reis, A. Sakasai, W. P. West*
- 930 A Two-Fluids Mixed-Flow Concept of Liquid Wall Fusion Divertor / *Hidetaka Taira, Saburo Toda, Kazuhisa Yuki*
- 934 Behavior of Falling Pebble for Pebble Divertor / *T. Okui, K. Matsuhiro, M. Isobe, M. Nishikawa*

SAFETY AND ENVIRONMENT

- 941 Accident Doses Analysis of the SOMBRERO Inertial Fusion Energy Power Plant Design / *S. Reyes, J. F. Latkowski, J. Gomez del Rio, J. Sanz*
- 946 Progress in Accident Analysis of the HYLIFE-II Inertial Fusion Energy Power Plant Design / *S. Reyes, J. F. Latkowski, J. Gomez del Rio, J. Sanz*
- 951 Comparison of the Safety and Environmental Characteristics of Refractory Alloys Under Consideration in APEX / *Kathryn A. McCarthy, David A. Petti, Hesham Y. Khater*
- 956 Measurement of the NIF Gunite Shielding Composition and Implications for Neutron Activation and Worker Doses / *J. F. Latkowski*
- 960 Preliminary Safety Assessment for an IFE Target Fabrication Facility / *J. F. Latkowski, S. Reyes, G. E. Besenbruch, D. T. Goodin*
- 965 Experimental Behavior of Molten $\text{Sn}_x \text{Li}_y$ When Impacted by a Vertical Column of Water / *M. H. Anderson, P. Meekunnasombat, M. L. Corradini*
- 970 Oxidation and Volatilization from Tantalum Alloy During Air Exposure / *G. R. Smolik, D. A. Petti, J. P. Sharpe, S. T. Schuetz*
- 976 Analysis of Liquid Cryogen-Water Experiments with the MELCOR Code / *R. C. Duckworth, J. G. Murphy, T. T. Utschig, M. L. Corradini, B. J. Merrill, R. L. Moore*
- 981 Reuse of Vanadium Alloys in Power Reactors / *E. T. Cheng, Takeo Muroga*
- 986 Clearance Issues for Advanced Fusion Power Plants / *L. El-Guebaly, D. Henderson, A. Abdou, P. Wilson, ARIES Team*
- 991 Qualitative Reliability Issues for In-Vessel Solid and Liquid Wall Fusion Designs / *Lee C. Cadwallader*
- 996 Pulsed Activation Modeling for Chamber Materials of IFE Power Reactors and Experimental Facilities / *J. Sanz, O. Cabellos, P. Yuste, S. Reyes, J. F. Latkowski*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 1003 Assessment of Personnel Accessibility in the X-1 Facility / *H. Y. Khater, M. E. Sawan, R. R. Peterson*
- 1008 Parametric Study of Accident Consequences from Different Weather Conditions. Application to IFE Power Plants / *J. Gomez del Rio, J. Sanz, S. Reyes, J. F. Latkowski*
- 1013 Safety Assessment of the Protective Gases Used in IFE Chambers / *H. Y. Khater, R. R. Peterson, I. N. Sviatoslavsky*
- 1018 Evaluation of Radioactive Waste Generated from the Compact Reversed Shear Tokamak Reactor (CREST) / *Yoshiyuki Asaoka, Kunihiko Okano, Tomoaki Yoshida, Ryouji Hiwatari, Seiji Mori*
- 1023 Decontamination of Candidate Materials for ITER Remote Handling Equipment Exposed to Tritiated Moisture / *Yasuhisa Oya, Kazuhiro Kobayashi, Wataru Shu, Takumi Hayashi, Shigeru O'hira, Hirofumi Nakamura, Yasunori Iwai, Masataka Nishi, Takeshi Higashijima, Kenjiro Obara, Kiyoshi Shibanuma, Kouichi Koizumi*
- 1028 The Possibility of Dust Removal in Fusion Plasma Device Using Thermo-phoretic Force / *Takehiko Yokomine, Akihiko Shimizu, Masamitsu Okuzono*
- 1033 Numerical Prediction of the Behavior of Tritium Released into a Large Room / *Kenzo Munakata*
- 1038 Desorption of Tritium from Metal Oxide Surface / *Kunihiko Chiba, Toshiaki Yoneoka, Satoru Tanaka*
- 1043 Numerical Simulations on Dust-Air Two-Phase Flows in Fusion Experimental Reactors During Loss-of-Vacuum-Accident Events / *Kazuyuki Takase*
- 1050 Analysis of Pressure Rise in an ITER-Like Fusion Reactor During In-Vessel LOCA by a Modified TRAC-PF1 Code / *Kazuyuki Takase, Yasuo Ose, Hajime Akimoto*
- 1056 A Preliminary Study on Direct-Contact Condensation Between Water and Vapor in a Suppression Tank for Fusion Reactor Safety / *Kazuyuki Takase*
- 1061 Characterization of Tokamak Dust Collected from Tore Supra / *J. Phillip Sharpe, Philippe Chappuis, David A. Petti*
- 1066 Characterization of Dust and Debris Collected from the Nova Facility / *J. Phillip Sharpe, W. Jon Carmack, David A. Petti*

TRITIUM

- 1073 Calculation of Recovery Rates of Tritium from Flibe Blanket / *Satoshi Fukada, Masabumi Nishikawa, Akio Sagara*
- 1078 A Design Study of Advanced Hydrogen Isotope Separation System for ITER / *Y. Iwai, T. Yamanishi, M. Nishi*
- 1083 Electrochemical Properties of Hydrogen Concentration Cell with Ceramic Protonic Conductor / *T. Kakuta, S. Konishi, Y. Kawamura, M. Nishi, T. Suzuki*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

PLASMA ENGINEERING, HEATING, AND CURRENT DRIVE

- 1091 Solution Techniques for Magnetic Flux Evolution in Toroidal Plasmas / *P. I. Strand, W. A. Houlberg*
- 1096 Extraction of Runaway Electrons from Helical Magnetic Confinement System / *Kei Kodera, Yuto Takeuchi, Yasushi Yamamoto, Nobuyuki Inoue*
- 1101 Application of Low Activation Ferritic Steel in the JFT-2M Tokamak—Evaluation of Magnetic Effect on the Plasma / *N. Isei, M. Sato, K. Tsuzuki, H. Kawashima, Y. Miura, H. Kimura, JFT-2M Group*
- 1106 A Design Study of the Power Supply System for Superconducting JT-60 / *Makoto Matsukawa, Shinichi Ishida, Akira Sakasai, Gen-ichi Kurita, Yushi Miura, Tsunehisa Terakado, Yoshikazu Ohmori, Syunzo Ohmori, Jun Okano, Katsuhiro Shimada, Nobuyuki Hosogane*
- 1111 The Performance of the 8.4 MW Modulator/Regulator Power Systems for the Electron Cyclotron Heating Facility Upgrade at DIII-D / *S. G. E. Pronko, S. Delaware, T. E. Harris, D. Hoyt, D. H. Kellman, R. A. Legg, M. Lontoc, A. Nerem, J. R. Valentine*
- 1116 Circuit Modeling and Feedback Controller Development of the 8.4 MW Modulator/Regulator Power System for the Electron Cyclotron Heating Facility Upgrade at DIII-D / *A. Nerem, D. H. Kellman, S. G. E. Pronko, J. R. Valentine*
- 1121 Design and Performance of the 110 GHz Electron Cyclotron Heating Installation on the DIII-D Tokamak / *D. Ponce, R. W. Callis, W. P. Cary, M. Condon, H. J. Grunloh, Y. Gorelov, R. A. Legg, J. Lohr, R. C. O'Neill, R. Cool, Y. Demers, S. Raftopoulos*
- 1126 A Regulated Power Supply for the Filaments of a High Power Gyrotron / *S. Delaware, R. A. Legg, S. G. E. Pronko*
- 1130 Indirectly Heated Cathode Development for Long-Pulse Neutral Beam Injectors / *C. C. Tsai, G. C. Barber, A. Fadnek, S. L. Milora, P. M. Ryan, D. A. Rasmussen, D. O. Sparks, D. E. Schechter, W. L. Stirling*
- 1135 Development of Negative Ion Based NBI System for JT-60U / *N. Umeda, N. Akino, N. Ebisawa, L. Grisham, S. Hikita, A. Honda, T. Itoh, M. Kawai, M. Kazawa, M. Kusaka, N. Kusanagi, M. Kuriyama, P. Lee, K. Mogaki, T. Ohga, H. Oohara, F. Satoh, H. Seki, N. Seki, Y. Tanai, R. Toyokawa, K. Usui, H. Yamazaki*
- 1140 Operation of the Positive-Ion Based NBI System for JT-60U / *H. Oohara, N. Akino, N. Ebisawa, S. Hikita, A. Honda, T. Itoh, M. Kawai, M. Kazawa, M. Kusaka, M. Kuriyama, K. Mogaki, T. Ohga, F. Satoh, H. Seki, Y. Tanai, R. Toyokawa, N. Umeda, K. Usui, H. Yamazaki*

PLASMA DIAGNOSTICS

- 1147 Conceptual Design of Compact Neutron Camera with Directional Neutron Detector for Nuclear Fusion Experiment / *T. Iguchi, S. Izuka, A. Uritani, J. Kawarabayashi*

(Continued)

CONTENTS / MARCH 2001—VOL. 39, NO. 2, PART 2

(Continued)

- 1152** A Large Dynamic Range Digital Controller for Use with CO₂ Pumped FIR Lasers / *J. D. Broesch, W. A. Peebles, P. Prybyl, R. T. Snider*
- 1157** Using LiD Convertor on Pulsed Graphite Reactor for Development of Nuclear-Physical Diagnostics of Thermonuclear Plasma / *V. P. Shestakov, I. L. Tazhibaeva, Yu. S. Cherepnin, E. N. Avrorin, V. G. Kiptily*

DEPARTMENTS

- 1160** 14th Topical Meeting on the Technology of Fusion Energy Technical Reviewers
- 1163** Author Index