3.05 Safety
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11037 Safety Principles and Safety Approaches for Next Generation Sodium-cooled Fast Reactor
By Yasushi Okano, Takaaki Sakai, Ryodai Nakai (JAEA)

11219 Conceptual Design for a Large-Scale Japan Sodium-Cooled Fast Reactor (2) Safety Design and Evaluation in JSFR
By Hidemasa Yamano (JAEA), Shigenobu Kubo (Japan Atomic Power Company), Yoshio Shimakawa (Mitsubishi FBR Systems, Inc.), Kaoru Fujita, Tohru Suzuki, Ken-ichi Kurisaka (JAEA)

11434 Comparison of LWR and SFR In-Containment Source Term: Similarities and Differences
By Luis E. Herranz, Mónica García (CIEMAT)

11139 A New Approach to Determine Sodium Bolling Onset Occurrence during ULOF Transients
By Guillaume Darmet, Simone Massara, Damien Schmitt (EDF R&D)

3.06 Lead Systems
Tuesday May 3, 14.45 pm – 16.05 pm

11380 SUPERSTAR: An Improved Natural Circulation, Lead-Cooled, Small Modular Fast Reactor for International Deployment
By J.J. Sienicki, A. Moisseytsev (Argonne National Laboratory), S. Bortot (Politecnico di Milano), Q. Lu (Univ of Illinois at Urbana Champaign), G. Aliberti (Argonne National Laboratory)

11119 Feasibility of Lead-Lithium Coolant for the ENHS Nuclear Battery Reactor
By Remi Cognet, Ehud Greenspan (Univ of California, Berkeley)

11063 Quick Conceptual Design Method for Battery Reactor Core
By Hyung M. Son, Kune Y. Suh (Seoul National Univ)

11480 Heavy Liquid Metal Network: HeLiMnet Project Overview
By Enrica Ricci (CNR-IENI), Silvia De Grandis (SINTEC), Dolores Gomez Briceno (CIEMAT), Fosca Di Gabriele (UV), Mariano Tarantino (ENEA), Concetta Fazio (KIT), Paul Schuurmans (SCK-CEN), Christian Latge (CEA), Werner Wagner (PSI), Sven Eckert (HZDR), Janis Freibergs (IPUL), Aram Karbojian (KTH), Jordi Abella (IQS)

3.07 ADS Systems
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11143 Designing Safety into High-power Neutron Spallation Sources
By Karel Samec, Yacine Kadi (CERN)
11319 Study of the Fuel Behavior, Safety Characteristics and Transmutation Performance of a Gas Cooled Accelerator Driven System (ADS)
By K. Biß, R. Nabbi, B. Thomauske (RWTH Aachen Univ)

11293 Experimental and Numerical Studies on Free Surface Behavior of Windowless Target
By Guan-yu Su, Xiang Chai, Han-yang Gu, Xu Cheng (Shanghai Jiao Tong Univ)

3.08 Non-classical Systems: Traveling Wave, MSR and Other NC
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11168 Some Remarks about the Neutron Flux Stability in a Traveling Wave Reactor
By Bernard Guesdon, Gilles Perrin (AREVA Research and Innovation Department)

11199 Conceptual Design of a 500 MWe Traveling Wave Demonstration Reactor Plant
By Charles Ahfeld, Tom Burke, Tyler Ellis, Pavel Hejzlar, Kevan Weaver, Chuck Whitmer, John Gilleland, Michael Cohen, Brian Johnson, Stephen Mazurkiewicz, Jon McWhirter, Ash Odedra, Nick Touran, Chal Davidson, Josh Walter, Robert Petroski, George Zimmerman, Tom Weaver, Pat Schweiger, Rob Russick (TerraPower, LLC)

11405 An Experiment to Study Pebble Bed Liquid-Fluoride-Salt Heat Transfer
By Graydon L. Yoder, Jr., Adam Aaron, Dennis Heatherly, David Holcomb, Roger Kisner, Mike McCarthy, Fred Peretz, John Wilgen, Dane Wilson (Oak Ridge National Laboratory)

11458 Risky Module Estimation for Nuclear Safety-Critical Software Using Machine Learning
By Young-Mi Kim, Choong-Heui Jeong (KINS), Hyeon Soo Kim (Chungnam Nat’l Univ)

4.01 I & C - Initiatives to Improve Reliability-I
Tuesday May 3, 10.30 am – 12.10 pm

11458 Risky Module Estimation for Nuclear Safety-Critical Software Using Machine Learning
By Young-Mi Kim, Choong-Heui Jeong (KINS), Hyeon Soo Kim (Chungnam Nat’l Univ)

11432 Advanced CANDU Instrumentation & Control Technologies – Application to the Enhanced CANDU 6 Design
By J. de Grosbois, G. Raiskums, M. Soulard (AECL)

11335 Development of Critical Digital Review Procedure and the Preliminary Application Experience
By Hui-Wen Huang (Institute of Nuclear Energy Research), Chunkuan Shih (National Tsing Hua Univ), Tsu-Mu Kao (Institute of Nuclear Energy Research)

11312 Development of Top-level Control Systems of NPP for Reactors of the VVER-1000 Type at the V.A. Trapeznikov Institute of Control Sciences of the Russian Academy of Sciences
By Nadyr E. Mengazetdinov, Aleksei G. Poletikin, Vitaly G. Promyslov (V.A. Trapeznikov Institute of Control Sciences)

4.01 I & C - Initiatives to Improve Reliability-II
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<tr>
<th>Paper ID</th>
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<tr>
<td>11124</td>
<td>Evaluation of Instrument Drift of RPS &amp; ESFAS for Nuclear Power Plant</td>
<td>In Hwan Kim, Duk Joo Yoon, Jae Yong Lee, Dong Soo Song (KEPRI)</td>
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<td>11075</td>
<td>Battery-Type-DP-Indicator for Nuclear Power Plant</td>
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<td>Assessment of the Time Parameters of a Nuclear Power Plant Distributed Control System</td>
<td>Vitaly Promyslov (V.A. Trapeznikov Institute of Control Sciences)</td>
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### 4.03 Initiatives to Improve Material Reliability or Material Performance-I

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<td>11408</td>
<td>Fatigue Cycle Monitoring</td>
<td>Kirby Woods (InnoTech Engineering Solutions, LLC), Ken Thomas (Nebraska Public Power District)</td>
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<tr>
<td>11254</td>
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<td>Ken Barry (EPRI)</td>
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<td>11204</td>
<td>Adapting the Gas Turbine Generator to Emergency Electrical Equipment for US-APWR</td>
<td>Shinji Niida, Hiroshi Fujimoto, Katsuhisa Takaura (Mitsubishi Heavy Industries), Richard Barnes (Mitsubishi Nuclear Energy Systems)</td>
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<td>11088</td>
<td>Development of Hi-F Coat to Reduce Recontamination for Carbon Steel</td>
<td>Makoto Nagase, Satoshi Oouchi, Ichirou Kataoka (Hitachi-GE Nuclear Energy, Ltd.), Tsuyoshi Ito, Hideyuki Hosokawa (Energy and Environmental Systems Laboratory, Hitachi, Ltd.)</td>
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<td>11077</td>
<td>Status of EPRI SGOG Steam Generators Chemical Cleaning Program in France</td>
<td>Bernard Mutius, Pierre Nemausat (Westinghouse Electrique France)</td>
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<td>11058</td>
<td>Role of Chemistry in the Phenomena Occurring in Nuclear Power Plants Circuits</td>
<td>Gabriel Planquette, Dominique You, Edmond Blanchard, Vincent Mertens, Christine Lamouroux (CEA)</td>
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### 4.04 Initiatives to Optimize Operation

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<td>11382</td>
<td>Theory and Calculation of the In-core Vanadium SPND Burn-up at the Nuclear Power Plant CNA II</td>
<td>Osvaldo Moreira (UG-CNA II)</td>
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<td>11287</td>
<td>MAGELAN, an Innovative Core Monitoring System to Optimize Plant Operation</td>
<td>A. L'Abbate, A. Lefevbre de Rieux, E. Rousseau (AREVA NP)</td>
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<tr>
<td>11089</td>
<td>Optimization for Steam Generator Level Control System Setpoints after Power Uprate</td>
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of Ulchin Units 1&2
By Duk-Joo Yoon, Jae-Yong Lee, In-Hwan Kim (KEPRI)

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11068 A Sensitivity Study of the Piping Spans Following the Mass Variations of the In-line Components
By Joon-Ho Lee, Sung-Ho Cho, Jae-Hwan Bae (KEPCO)

11062 Modeling of Artificial Stiction in Steam Turbine Control Valve
By B. Halimi, Kune Y. Suh (Seoul National Univ)

11043 Application of GO-FLOW Methodology for Reliability Analysis of Auxiliary Feedwater System in Nuclear Power Plant
By Yongyue Chu, Ming Yang, Wanqing Chen (Harbin Engineering Univ)

11064 Enhancing Seismic Safety at Kashiwazaki Kariwa Nuclear Power Station
By Hideki Masui (TEPCO)

4.05 Initiatives or Feedback to Improve the Maintenance Methods-II
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11242 Equipment Health Management Assessment of Nuclear Condensate Pump Motor Stators
By Ivan Scivetti, Cian O'Duffy, Timothy Hattrell, Matthew Jones (Rolls-Royce Civil Nuclear)

11228 The Application of Novel Technologies to Nuclear Service Issues
By Rod Webster (Rolls-Royce)

11069 Experience in the Maintenance of Sodium Systems of Fast Breeder Test Reactor
By B. Anandapadmanaban, A. Babu, G. Srinivasan (IGCAR)

4.07 Initiative to Manage the Impact of Material Degradation
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11438 Flow Accelerated Corrosion Problem in Steam Condensate Piping and Valves: Problems Faced & Actions Taken
By K.C. Upreti, Sai Vamsidhar Bontha (Reliance Industries Limited)

11411 Impact of Residual Stress on Reactor Vessel Nozzle Dissimilar Metal Weld PWSCC Crack Growth
By C.K. Ng, A. Udyawar, S. Swamy (Westinghouse)

11296 Improvement on the EDF Monitoring System for the Evaluation of Thermal Stratification
By C. Naudin (EDF/SEPTEN), S. Blairon (EDF/R&D/STEP), S. Vidard (EDF/SEPTEN), B. Barthelet (EDF/DPN/UNIE)

4.08 Initiatives to Improve HMI and HSI
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11415 Development of a Framework to Measure Communication Quality of Human Operators in Nuclear Power Plants
By Seunghwan Kim, Jinkyun Park (KAERI)
By Mauro Cappelli (ENEA), Adam Maria Gadomski (ECONA), Massimo Sepielli (ENEA)

11189 Life Cycle Planning For Nuclear Plant Staffing
By Charles T. Goodnight (Goodnight Consulting, Inc.)

11095 Discernment as a Key Factor for Resilience at a Nuclear Power Plant
By Margaretha Engström (Vattenfall Research & Development AB)

11052 A Proactive Alarm Reduction Method and its Human Factors Validation Test of a Main Control Room for SMART
By Gwi-sook Jang, Sang-moon Suh, Sa-kil Kim, Sung-chul Lee, Yong-suk Suh (KAERI)

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5.01 International and Experimental Programs on Severe Accidents
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11369 Some Outcomes of the SARNET Network on Severe Accidents at Mid-term of the FP7 Project
By Jean-Pierre Van Dorsselaere (IRSN), Ari Auvinen (VTT), David Beraha (GRS), Patrick Chatelard (IRSN), Christophe Journeau (CEA), Ivo Kljenak (JSI), Alexei Miassoedov (Karlsruhe Institute of Technology (KIT)), Sandro Paci (Univ. of Pisa), Th. Walter Tromm (Karlsruhe Institute of Technology (KIT)), Roland Zeyen (EC JRC/IE)

11258 ASTEC Validation on OECD/THAI HM2
By Ahmed Bentaib, Alexandre Bleyer (IRSN)

11147 Phebus FPT3: Overview of Main Results Concerning Core Degradation and Fission Product Behaviour
By Tim Haste, Bernard Clement, Bruno Biard, Christelle Manenc, Frederic Payot, Philippe March, Beatrice Simondi-Teisseire (IRSN), Roland Zeyen (EC JRC/IE)

11450 Source Term Computation with ASTEC Code
By F. Cousin, L. Cantrel, C. Seropian, K. Chevalier-Jabet (IRSN)

5.02 Phenomenology and Chemistry of Severe Accidents
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11234 Hydrogen Distribution and Management During Postulated Severe Accident in KAPS # 384 700 MWe Containment
By Sanjeev Kr Sharma, D.K. Bhartia, Nalini Mohan, P.K. Malhotra, S.G. Ghadge (Nuclear Power Corporation of India Limited)

11173 Hydrogen Combustion in the EPR™ Containment after a Postulated Reactor Pressure Vessel Failure
By Harald Dimmelmeier, Jürgen Eyink (AREVA NP)

11313 Chemistry of Iodine and Aerosol Composition in the Primary Circuit of a Nuclear Power Plant
By Mélanie Gouello (IRSN), Marion Lacoue-Nègre (IRSN, CNRS), Hervé Mutelle, Frédéric Cousin (IRSN), Sophie Sobanska, Elisabeth Blanquet (CNRS)

11395 High-temperature Reaction of alpha-Zr(O) with Nitrogen
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11030 Planning Support and Preliminary Post-test Analysis of QUENCH-L0 using SCDAP/RELAP and SCDAP/Sim
By Leticia Fernandez Moguel, Jonathan Birchley (PSI)

11354 Experimental and Kinetic Study of the Iodine Reactivity in Low Pressure H2/O2/H2O/HI/Ar Premixed Flames
By Y.G. Delicat (PC2A, IRSN, C3R), L. Gasnot, J.F. Pauwels (PC2A, C3R), A.C. Gregoire, L. Cantrel (IRSN, C3R)

11226 Experimental Results of the Commissioning Bundle Test QUENCH-L0 Performed in Framework of the QUENCH-LOCA Program
By J. Stuckert, M. Große, C. Rössger, M. Steinbrück, M. Walter (Karlsruhe Institute of Technology)

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11057 The Impact of Thermal Chemical Phenomena on the Heat Fluxes into the RPV during In-Vessel Melt Retention
By M. Fischer, P. Levi, G. Langrock (AREVA NP GmbH), A.A. Sulatsky, E.V. Krushinov (A.P. Alexandrov Research Institute of Technology)

11200 Evaluation of Debris Particle Transport for Pre- and In-Recirculation Phases of OPR1000
By Young Seok Bang, Gil Soo Lee, Byung-Gil Huh, Sweng-Woong Wong (KINS)

11320 Using Accident Management to Address Phenomenological Uncertainties Related to Lower Plenum Debris Bed Chemistry and Mixing during AP1000 In-Vessel Retention (IVR) of Molten Core Debris
By James H. Scobel, Yves Masset, Rachel A. Salano, John T. Kitzmiller, Robert J. Lutz, Camille Zozula, Luca Oriani (Westinghouse), Martin G. Plys (Fauske and Associates, Inc.)

11416 Effects of Water Pool Subcooling on the Debris Bed Spreading by Coolant Flow
By Sergey Yakush (Institute for Problems in Mechanics, Russian Academy of Sciences), Pavel Kudinov (Royal Institute of Technology (KTH))
5.05 Severe Accidents: Experiments on Coolability
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11252 Exploration of Coolability of Melt Layer under Bottom Injection (COMET Concept) Using the MEWA-COMET Code
By S. Rahman, M. Bürger, M. Buck, G. Pohlner (IKE, Univ of Stuttgart)

11185 An Experimental Study on Dryout Heat Flux in Particulate Bed Packed with Irregular Particles
By Liangxing Li, Aram Karbojian, Pavel Kudinov, Weimin Ma (KTH)

11253 SG Retention Predictability during “Dry” Severe Accident SGTR Sequences: An Assessment of Uncertainties
By Claudia López, Luis E. Herranz (CIEMAT)

5.06 Corium Retention: Phenomenology and Technology
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11414 Evaluation on Core Melt Retention in Core Catcher of Toshiba’s EU-ABWR
By Ryoichi Hamazaki (Toshiba Corporation), Takahiro Nakagawa (Toshiba Plant Systems and Services Corporation), Noriyuki Katagiri, Mika Tahara, Mitsuo Komuro, Toshimi Tobimatsu, Yuka Susuki, Tomohisa Kurita (Toshiba Corporation)

11216 A Core Catcher Design for the Advanced Light Water Reactor

11375 Study of the Processes of Corium-melt Retention in the Reactor Pressure Vessel (INVECOR)
By Vladimir Zhdanov, Viktor Baklanov (NWC), Paul David W. Bottomley (ITU), Alexei Miassoedov, T. Walter Tromm (KIT), Christophe Journeau (CEA Cadarache), Eberhardt Altstadt (FZ Rossendorf), Bernard Clement (IRSN), Francesco Oriolo (Pisa Univ)

11015 Experiments on In-vessel Melt Pool Formation and Behaviour in the LIVE-2D Test Facility
By Frank Kretzschmar (KIT)

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11042 Sensitivity Analysis for the SBO Emergency Depressurization Using MAAP5 Code
By Chih-Ming Tsai, Shou-Che Wu (Institute of Nuclear Energy Research), Jr-Ren Tsai (Navy Command Headquarter)

11229 Sensitivity Studies on Uncertainty Parameters and Code Modeling of Calandria Vessel Integrity during Late Phase CANDU 6 Severe Accident
By Daniel Dupleac (Politehnica Univ of Bucharest), Mirea Mladin (Institute for Nuclear Research), Ilie Prisecaru (Politehnica Univ of Bucharest)

11110 Verification of a SAPHIRE Living PSA-Model for Leningrad NPP Unit 1
By Bronislav Vinnikov (RRC "Kurchatov Institute")

11039 Statistical Evaluation of 4S Safety Performance at ATWS
By Kyoko Ishii, Hisato Matsumiya, Hideki Horie (Toshiba Corporation)
11012 Investigating the Effectiveness of the Execution of EOPs for ATWS Scenarios Using MAAP5 Code
By Jyh-Tong Teng, Shin-Cin Wu (Chung Yuan Christian Univ (CYCU)), Te-Chuan Wang, Yu-Huai Shih (Institute of Nuclear Energy Research (INER))

5.08 Analysis and Simulation-I
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11026 Investigation of Coolant Mixing in Reactor VVER-1000
By E.A. Lisenkov, Yu. A. Bezrukov, D.V. Uliyanovskiy, D.V. Zaytsev, M.A. Bykov, A.V. Shishov (OKB "Gidropress"), F. Moretti, A. Del Nevo, F. D'Auria (Univ di Pisa (UNIPI)), U. Rohde, T. Höhne (FZD), D. Gallori (AREVA NP SAS)

11233 A Numerical Analysis on the Hydrodynamics of Heavy Molten Droplets in a Water Pool
By Sachin Thakre, Liangxing Li, Weimin Ma (KTH (Royal Institute of Technology))

11067 Evaluation of the Inadvertent Actuation of the Passive Residual Heat Removal System Event in the AP1000® Nuclear Plant
By Richard F. Wright, Toby Burnett, Alan J. MacDonald (Westinghouse), Qiao Wu (Oregon State Univ)

5.08 Analysis and Simulation-II
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11093 Thermal Hydraulic Phenomena Caused by the Interaction of Steam and Steam-Helium Mixture Wall Jets with a Containment Cooler
By Ralf Kapulla, Guillaume Mignot, Domenico Paladino, Nejdet Erkan, Robert Zboray (PSI)

11430 A Comparison of Non-Parametric Tolerance Limits with Linear Combinations of Order Statistics in Safety Analysis
By Cesare Frepoli (Westinghouse), Satish Iyengar (Univ of Pittsburgh)

11076 The Technology of High-Temperature Reactors: Design, Commissioning, and Operational Results of AVR-15-MW(e) Experimental Reactor Jülich, Germany and THTR-300-MW(e) Demonstration Reactor Schmelhausen, Germany and Their Impact on Future Designs
By Urban Cleve, Klaus Knizia, Kurt Kugeler (Consultant)

11478 An Integrated Software Platform for Best Estimate Safety Analyses of Nuclear Power Plants
By F. Fiori, A. Kovtonyuk, N. Muelleir, F. D'Auria (Univ of Pisa)

5.09 Thermal-Hydraulic Studies and Modelling
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11081 Assessment of New Modeling in RELAP/SCDAPSIM Using Experimental Results from the Quench Program
By Wen-Hsiung Wu, Jong-Rong Wang, Yng-Ruey Yuann (Institute of Nuclear Energy Research), Chun-Kuan Shih (National Tsing-Hua Univ), Su-Chin Cheng, Fong-Lun Lin (Taiwan Power Company)