

WORKSHOP PROGRAMME

First Day, Tuesday, 5 September

Times	Room A	Room B
08.30 – 09.30	Registration	
09.00 – 09.30	Opening Remarks: B. Smith (PSI, Switzerland), Welcoming Address: L. Hahn (GRS, Germany)	Video relay
09.30 – 10.30	Keynote Lecture: M. Réocreux (IRSN, France) Safety Issues Concerning Nuclear Power Plants: the Role of CFD	Video relay of Keynote Lecture
10.30 – 11.00	Coffee Break	
11.00 – 12.45	Technical Session A1 (4 papers) Chairman: M. Henriksson	Technical Session B1 (4 papers) Chairman: J. Mahaffy
12.45 – 14.15	Lunch	
14.15 – 15.15	Lecture: M. Gavrilas (NRC, USA) Lessons Learned from International Standard Problem No. 43 on Boron Mixing	Video relay of Keynote Lecture
15.15 – 16.00	Technical Session A2 (2 papers) Chairman: P. Mühlbauer	Technical Session B2 (2 papers) Chairman: B. Smith
16.00 – 16.30	Coffee Break	
16.30 – 17.15	Technical Session A3 (2 papers) Chairman: T. Morii	Technical Session B3 (2 papers) Chairman: M. Houkema
17.30 – 19.30	Vernissage: Kawagui – Driftwood (refreshments served)	
19.30	Bus leaves for hotels	

Second Day, Wednesday, 6 September

Times	Room A	Room B
09.00 – 10.00	Keynote Lecture: W. Oberkampf (SNL, USA) Design of and Comparison with Verification and Validation Benchmarks Keynote	Video relay of Keynote Lecture
10.00 – 11.15	Technical Session A4 (3 papers) Chairman: T. Höhne	Technical Session B4 (3 papers) Chairman: M. Heitsch
11.15 – 11.45	Coffee Break	
11.45 – 13.00	Technical Session A5 (3 papers) Chairman: U. Rhode	Technical Session B5 (3 papers) Chairman: M. Andreani
13.00 – 14.30	Lunch	
14.30 – 15.30	Keynote Lecture: H.-M. Prasser (ETHZ, Switzerland) Novel Experimental Measuring Techniques Required to Provide Data for CFD Validation	Video relay of Keynote Lecture
15.30 – 16.00	Coffee Break	
16.00 – 17.15	Technical Session A6 (3 papers) Chairman: D. Bestion	Technical Session B6 (3 papers) Chairman: D. Lucas
17.30	Bus leaves for hotels	
19.00	Bus pick-up at hotels	
20.00 – 22.00	Conference Banquet at Schloss Nymphenburg	

Third Day, Thursday, 7 September

Times	Room A	Room B
09.00 – 10.00	Keynote Lecture: G. Yadigaroglu (ETHZ, Switzerland) CFD4NRS with a Focus on Experimental and CMFD Investigations of Bubbly Flows	Video relay of Keynote Lecture
10.00 – 11.15	Technical Session A7 (3 papers) Chairman: F. Moretti	Technical Session B7 (2 papers) J. Mahaffy
11.15 – 11.45	Coffee Break	
11.45 – 12.45	Panel Session	
12.45 – 14.00	Lunch	
14.00 – 17.00	Visit to FRM II in Garching or Aerodrome Flugwerft Schleißheim	
	End of Workshop	

Technical Session A1

Plant Applications

1. **M. Böttcher, Detailed CFX-5 Study of the Coolant Mixing within the Reactor Pressure Vessel of a VVER-1000 Reactor during a Non-Symmetrical Heat-Up Test**
Forschungszentrum Karlsruhe, Institut für Reaktorsicherheit, Hermann-vom-Helmholtz-Platz-1, D-76344 Eggenstein-Leopoldshafen
2. **I. Boros, A. Aszódi, Analysis of Thermal Stratification in the Primary Circuit with the CFX Code**
Budapest University of Technology and Economics, Institute of Nuclear Techniques
3. **E. Romero, CFD Modelling of a Negatively Buoyant Purge Flow in the Body of a Reactor Coolant Circulator**
Rolls-Royce PLC, P.O. Box 3, Bristol BS34 7QE, UK **WITHDRAWN**
4. **G. Légrádi, I. Boros, A. Aszódi, Comprehensive CFD Analyses Concerning the Serious Incident which occurred in the PAKS NPP in Spring 2003**
Budapest University of Technology and Economics, Institute of Nuclear Techniques, Hungary

Technical Session B1

Advanced Reactors

5. **T. Morii, Hydraulic Flow Tests of APWR Reactor Internals for Safety Analysis**
Japan Nuclear Energy Safety Organization, Japan
6. **R. W. Johnson, Modeling Strategies for Unsteady Turbulent Flows in the Lower Plenum of the VHTR**
Idaho National Laboratory, USA
7. **H. S. Kang, C. H. Song, CFD Analysis of Thermal Mixing in a Subcooled Water Pool under High Steam Mass Flux**
Korea Atomic Energy Research Institute, Korea
8. **K. Velusamy, K. Natesan, P. Selvaraj, P. Chellapandi, S. C. Chetal, T. Sundararajan¹, S. Suyambazhahan¹, CFD Studies in the Prediction of Thermal Striping in an LMFBR**
Nuclear Engineering Group, Indira Gandhi Centre for Atomic Research, Kalpakkam, India, ¹Department of Mechanical Engineering, Indian Institute of Technology Madras, Chennai, India **WITHDRAWN**

Technical Session A2

Benchmark Exercises

9. *M. Andreani¹, K. Haller¹, M. Heitsch², B. Hemström³, I. Karppinen⁴, J. Macek⁵, J. Schmid⁵, H. Paillere⁶, I. Toth⁷*, **A Benchmark Exercise on the use of CFD Codes for Containment Issues using Best Practice Guidelines: a Computational Challenge**
¹Paul Scherrer Institut (PSI), ²Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH, Germany, ³Vattenfall Utveckling AB, ⁴Technical Research Centre of Finland (VTT), ⁵Ustav Jaderneho Vyzkumu (NRI), ⁶Commissariat à l'Energie Atomique (CEA), ⁷Atomic Energy Research Institute- Hungarian Academy of Science (KFKI)
10. *T. Toppila*, **CFD Simulation of FORTUM PTS Experiment**
Fortum Nuclear Services Ltd, Espoo, Finland

Technical Session B2

CANDU Reactors

11. *H. S. Kang*, **CFD Analysis for the Experimental Investigation of a Single Channel Post-Blowdown**, *Korea Atomic Energy Research Institute, Taejeon 305-600, Korea*
12. *H. T. Kim, B. W. Rhee, J. H. Park*, **CFX Simulation of a Horizontal Heater Rods Test**
Korea Atomic Energy Research Institute, Daejeon 305-353, Korea

Technical Session A3

Novel Applications

13. *U. Graf, P. Papadimitriou*, **Simulation of Two-Phase Flows in Vertical Tubes with the CFD Code FLUBOX**
Gesellschaft fuer Anlagen- und Reaktorsicherheit (GRS) mbH, Garching, Germany
14. *Y. A. Hassan*, **Large-Eddy Simulation in Pebble Bed Gas Cooled Core Reactors**
Texas A&M University, Texas, USA

Technical Session B3

Containment Issues I

15. *I. Kljenak, M. Babić, B. Mavko*, **Prediction of Light Gas Distribution in Containment Experimental Facilities using CFX4 Code: Jozef Stefan Institute Experience**
Reactor Engineering Division, Jozef Stefan Institute, Ljubljana, Slovenia
16. *S. Kudriakov¹, F. Dabbene¹, E. Studer¹, A. Beccantini¹, J.P. Magnaud¹, H. Paillère¹, A. Bentaib², A. Bleyer², J. Malet² and C. Caroli²*, **The TONUS CFD Code for Hydrogen Risk Analysis: Physical Models, Numerical Schemes and Validation Matrix**
¹CEA Saclay, ²Institut de Radioprotection et de Sureté Nucléaire (IRSN), France

Technical Session A4

Boron Dilution

17. *S. Kliem, T. Sühnel, U. Rohde, T. Höhne, H.-M. Prasser, F.-P. Weiss, Experiments at the Mixing Test Facility ROCOM for Benchmarking of CFD Codes*
Forschungszentrum Rossendorf, Institute of Safety Research, Dresden, Germany
18. *T. V. Dury¹, B. Hemström² and S. V. Shepel¹, CFD Simulation of the Vattenfall 1/5th-Scale PWR Model for Boron Dilution Studies*
¹Paul Scherrer Institute (PSI), 5232 Villigen PSI, Switzerland, ²Vattenfall Utveckling AB, Älvkarleby, Sweden
19. *E. Graffard, F. Goux, CFX Code Application to the French Reactor for Inherent Boron Dilution Safety Issue*
Institute for Radiological Protection and Nuclear Safety, France

Technical Session B4

Containment Issues II

20. *E. Porcheron, P. Lemaitre, A. Nuboer, V. Rochas, J. Vendel, Experimental Study of Heat, Mass and Momentum Transfers in a Spray in the TOSQAN Facility*
Institut de Radioprotection et de Sûreté Nucléaire (IRSN), Saclay, France
21. *J. Malet¹, P. Lemaitre¹, E. Porcheron¹, J. Vendel¹, L. Blumenfeld², F. Dabbene², I. Tkatschenko², Benchmarking of CFD and LP Codes for Spray Systems in Containment Applications: Spray Tests at Two Different Scales in the TOSQAN and MISTRA Facilities*
¹Institut de Radioprotection et de Sûreté Nucléaire (IRSN), Saclay, France, ²Commissariat à l'Energie Atomique (CEA) Saclay, France
22. *M. Houkema, N.B. Siccama, Validation of the CFX-4 CFD Code for Containment Thermal-Hydraulics*
Nuclear Research and Consultancy Group NRG, Petten, The Netherlands

Technical Session A5

Mixing in Primary Circuit

23. *T. Höhne, S. Kliem, Coolant Mixing Studies of Natural Circulation Flows at the ROCOM Test Facility using ANSYS CFX*
Forschungszentrum Rossendorf (FZR), Institute of Safety Research, Dresden, Germany
24. *S. K. Chang^{1,2}, S. K. Moon¹, B. D. Kim¹, W. P. Baek¹, Y. D. Choi², Phenomenological Investigations on the Turbulent Flow Structures in a Rod Bundle Array with Mixing Devices*
¹Korea Atomic Energy Research Institute, 105, Daejeon, 305-353, Republic of Korea, ²Korea Univ., Mechanical Engineering Dept., Seoul, Republic of Korea

25. J. Westin¹, F. Alavyoon², L. Andersson³, P. Veber³, M. Henriksson¹, C. Andersson⁴,
Experiments and Unsteady CFD-Calculations of Thermal Mixing in a T-junction
¹Vattenfall Utveckling AB, ²Forsmarks Kraftgrupp AB, ³Onsala Ingenjörbyrå AB,
Magasinsgatan 11b, ⁴Ringhals AB, SWEDEN

Technical Session B5

Containment Issues III

26. P. Royl, J. R. Travis, W. Breitung, **Modelling and Validation of Catalytic Hydrogen Recombination in the 3D CFD Code GASFLOW II**
Forschungszentrum Karlsruhe, Institut für Kern- und Energietechnik, Germany
27. H. Wilkening¹, D. Baraldi¹, M. Heitsch², **On the Importance of Validation when using Commercial CFD Codes in Nuclear Reactor Safety**
¹Institute for Energy, DG Joint Research Centre, Petten, The Netherlands
²Gesellschaft für Anlagen- und Reaktorsicherheit GRS (mbH), Köln, Germany
28. R. Redlinger, **DET3D - A CFD Tool for Simulating Hydrogen Combustion in Nuclear Reactor Safety**
Forschungszentrum Karlsruhe, Institut für Kern- und Energietechnik, Germany

Technical Session A6

Stratification Issues

29. T. Winterle¹, E. Laurien¹, T. Stähler², L. Meyer², T. Schulenberg², **Experimental and Numerical Investigation of Counter-Current Stratified Flows in Horizontal Channels**,
¹University of Stuttgart, Institute for Nuclear Technology and Energy Systems, Germany,
²Forschungszentrum Karlsruhe, Institut für Kern- und Energietechnik, Germany
30. L. Štrubelj, I. Tiselj, B. Končar, **Modelling of Direct Contact Condensation in Horizontally Stratified Flow with CFX Code**
Jožef Stefan Institute, Reactor Engineering Division, Ljubljana, Slovenia
31. C. Vallée, T. Höhne, H.-M. Prasser, T. Sühnel, **Experimental Investigation and CFD Simulation of Horizontal Stratified Two-Phase Flow Phenomena**
Forschungszentrum Rossendorf e.V., Dresden, Germany

Technical Session B6

Code Validation

32. Th. Frank¹, P.J. Zwart², E. Krepper³, H.-M. Prasser³, D. Lucas³, **Validation of CFD Models for Mono- and Polydisperse Air-Water Two-Phase Flows in Pipes**
¹ANSYS Germany GmbH, Otterfing, Germany, ²ANSYS Canada Ltd., Waterloo, Ontario, Canada, ³FZ Rossendorf, Institute of Safety Research, Dresden, Germany
33. V. Ustinenko¹, M. Samigulin¹, A. Ioilev¹, S. Lo², A. Tentner³, A. Lychagin⁴, A. Razin⁴, V. Girin⁴, Ye. Vanyukov⁴, **Validation of CFD-BWR: a New Two-Phase Computational Fluid Dynamics Model for Boiling Water Reactor Analysis**
¹Russian Federal Nuclear Center (VNIIEF), Russian Federation, ²CD-adapco, UK,
³Argonne National Laboratory, USA, ⁴Sarov Laboratories, Russian Federation

34. U. Bieder¹, E. Graffard², **Qualification of the CFD Code TRIO_U for Full-Scale Nuclear Reactor Applications**
¹CEA-Grenoble, DEN/DER/SSTH/LMDL, 15 rue des Martyrs, F-38054 Grenoble, France
²IRSN, DSR/ST3C/BATH, B.P.17, F-92262 Fontenay-aux-Roses, France

Technical Session A7

Boiling Models

35. B. J. Yun, D. J. Euh, C. H. Song, **Experimental Investigation of Subcooled Boiling on One Side of a Heated Rectangular Channel**
Thermal Hydraulics and Safety Research Div., KAERI, Korea
36. S. Mimouni, M. Boucker, J. Laviéville, D. Bestion¹, **Modeling and Computation of Cavitation and Boiling Bubbly Flows with the NEPTUNE_CFD Code**
Electricité de France R&D Division, Chatou, France, ¹CEA-Grenoble, Direction l'Energie Nucléaire, Grenoble, France
37. B. Končar¹, E. Krepper², **CFD Simulation of Forced Convective Boiling in Heated Channels**
¹Jožef Stefan Institute, Slovenia, ²Forschungszentrum Rossendorf, Dresden, Germany

Technical Session B7

Containment Issues IV

38. P. Royl, U. J. Lee¹, J. R. Travis, W. Breitung, **Benchmarking of the 3D CFD Code GASFLOW II with Containment Thermal Hydraulic Tests from HDR and ThAI**
Forschungszentrum Karlsruhe, Institut für Kern- und Energietechnik, Germany
¹Korea Atomic Energy Research Institute (KAERI), Daejeon, Korea
39. A. Dehbi, **Assessment of a New FLUENT Model for Particle Dispersion in Turbulent Flows**
Paul Scherrer Institut, Laboratory for Thermal Hydraulics, Switzerland