



Final International Workshop

Tuesday 19 March

Opening

Location: Auditorium

9:00-9:30	O001	Registration	All
9:30-9:50	O002	Welcome & Book Presentation	Schram (NRG)
9:50-10:15	O003	Opening	Roelofs (NRG), Tarantino (ENEA)
10:15-10:45	O004	Opening Address European Commission	Garbil (EC)

Opening Keynotes

Chair: Mariano Tarantino

11:00-11:30	K007	KEYNOTE: Industry Perspective on Liquid Metal Fast Reactor Thermal Hydraulics	Ferroni (WEC)
11:30-12:00	K006	KEYNOTE: Matched-Index of Refraction Experiments for Liquid Metal Fast Reactors	Hassan (TAMU)
12:00-12:30	O005	ALFRED: a revised concept to improve pool related thermal-hydraulics	Frignani* (ANN), Alemberti (ANN), Tarantino (ENEA), Constantin (ICN)

Location: Grote Vergaderzaal

12:30-13:50	Lunch		
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Keynote

Location: Auditorium

Chair: Elia Merzari

13:50-14:20	K001	KEYNOTE: Turbulent Heat Flux Modelling with A focus on the Elliptic Blending approach	Wald (EDF)
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Parallel Session (Fluctuations 1)

Chair: Afaque Shams & Iztok Tiselj

Location: Grote Lunchkamer

14:30-14:50	S002	Reference Numerical Database for Turbulent Flow and Heat Transfer in Liquid Metals	Shams* (NRG), Roelofs (NRG), Niceno (PSI), Guo (PSI), Stalio (UniMoRe), Angeli (UniMoRe), Fregni (UniMoRe), Duponcheel (UCL), Bartosiewicz (UCL), Tiselj (JSI), Oder (JSI)
14:50-15:10	S034	Direct Numerical Simulation of a Mixed Convection Flow in Liquid Metal with Varying Buoyancy	Guo (PSI), Shams* (NRG), Niceno (PSI)
15:10-15:30	S050	Direct Numerical Simulation of Low-Prandtl-number Jets in Mixed Convection Regime	Fregni (UniMoRe), Angeli (UniMoRe), Cimarelli (Cardiff U.), Stalio* (UniMoRe)

Parallel Session (System and V&V 1)

Chair: Antoine Gerschenfeld

Location: Auditorium

14:30-14:50	S053	Uncertainty Quantification in Tall-3D Simulations with Coupled ATHLET and ANSYS CFX Codes	Liu* (TUM), Macian (TUM)
14:50-15:10	S059	Code Validation Activities within the European SESAME Project and Some Lessons Learned	Papukchiev* (GRS), Geffray (CEA), Liu (TUM), Grishchenko (KTH), Kudinov (KTH)
15:10-15:30	S046	Lessons learned from the blind benchmark on natural circulation instability in TALL-3D	Grishchenko* (KTH), Papukchiev (GRS), Geffray (CEA), Liu (TUM), Polidori (ENEA), Koop (KTH), Jeltsov (KTH), Kudinov (KTH)

Parallel Session (Core Thermal Hydraulics 1)

Chair: Abdalla Batta & Andreas Class

Location: Grote Vergaderzaal

14:30-14:50	S024	Mixed Convection of LBE in the Fuel Pin Bundle of the NACIE-UP Facility: Experiments and Simulations	Angeli* (UniMoRe), Di Piazza (ENEA), Marinari (ENEA), Stalio (UniMoRe)
14:50-15:10	S060	Reduced-resolution RANS Approach to grid Spacer Fuel Assemblies	Mathur* (NRG), Uitslag-Doolaard (NRG), Roelofs (NRG)
15:10-15:30	S055	High-Fidelity Velocity Measurements in a Totally Blocked Interior Subchannel of a Wire-wrapped 61-Pin Hexagonal Fuel Bundle	White (TAMU), Goth (TAMU), Nguyen (TAMU), Vaghetto* (TAMU), Hassan (TAMU)

Keynote

Chair: Joris Degroote
 Location: Auditorium

15:50-16:20	K002	KEYNOTE: Fluid Structure Interaction	Steer (Terrapower)
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Parallel Session (Fluctuations 2)

Chair: Afaque Shams & Bojan Niceno
 Location: Grote Vergaderzaal

16:30-16:50	S015	Large Eddy Simulations on a Natural Convection Boundary Layer at Pr-071 and 0.025	Villa Ortiz* (VKI), Koloszar (VKI), Planquart (VKI)
16:50-17:10	S019	Thermal Fluctuations in Low-Prandtl Fluid Flows over a Backward Facing Step	Oder* (JSI), Tiselj (JSI), Jaeger (KIT), Schaub (KIT), Otic (KIT), Shams (NRG)
17:10-17:30	S022	Direct Numerical Simulation of Turbulent Mixed Convection of a Liquid Metal in a Bundle of Heated Rods	Angeli* (UniMoRe), Fregni (UniMoRe), Stalio (UniMoRe)

Parallel Session (System and V&V 2)

Chair: Antoine Gerschenfeld
 Location: Auditorium

16:30-16:50	S010	The Dissymmetric Phénix End of Life Test	Geffray* (CEA), Gerschenfeld (CEA), Grosjean (CEA)
16:50-17:10	S009	Multi-scale Modelling of the Phénix Dissymmetric Test Benchmark	Uitslag-Doolaard* (NRG), Alcaro (NRG), Roelofs (NRG), Wang (KIT), Kraus (ANL), Brunett (ANL), Thomas (ANL), Geffray (CEA), Gerschenfeld (CEA)
17:10-17:30	S025	System Thermal-Hydraulic Modelling of the Phénix Dissymmetric Test Benchmark	Narcisi* (UniRM1), Gianetti (UniRM1), Del Nevo (ENEA), Alcaro (NRG), Wang (KIT), Kraus (ANL), Brunett (ANL), Thomas (ANL), Girault (IRSN), Caruso (UniRM1), Gerschenfeld (CEA)

17:45	Bus Transport
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Wednesday 20 March

Keynote

Chair: Dmitry Grishchenko
 Location: Auditorium

9:00-9:30	K004	KEYNOTE: System Thermal Hydraulics	Ren (CIAE)
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Parallel Session (Severe Accidents)

Chair: Dmitry Grishchenko
 Location: Grote Lunchkamer

9:40-10:00	S052	Development of the Source Term Analysis Tool SAS4A-FATE for Lead- and Sodium-cooled Fast Reactors	Lee (F&A), Paik (F&A), Hua (ANL), Moiseyev (ANL), Karahan (ANL), Tentner (ANL), Sofu (ANL), Liao (WEC), Ferroni* (WEC)
10:00-10:20	R002	IPPE Experimental and Computational Capabilities in Modelling Severe Accidents in Fast Reactors	Kuzina (IPPE), Raskach* (IPPE)
10:20-10:40	U000	Empty Time Slot	

Parallel Session (System and V&V 3)

Chair: Ivan Di Piazza
 Location: Auditorium

9:40-10:00	S032	Heat Losses and Thermal Hydraulics Characterization of the CIRCE-HERO Experimental Facility	Pesetti (UNIFI), Martelli (UNIFI), Del Nevo (ENEA), Forgione (UNIFI), Gianetti (UniRM1), Lorusso (UniRM1), Tarantino (ENEA)
10:00-10:20	S043	RELAP5-3D© and Modified RELAP5/MOD.3.3 Calculation Comparison of a PLOHS + LOF Transient in CIRCE-ICE Test Facility	Narcisi* (UniRM1), Gianetti (UniRM1), Polidori M. (ENEA), Tarantino (ENEA), Caruso (UniRM1)
10:20-10:40	S008	Multi-scale Modelling of the CIRCE-HERO Facility	Zwijsen* (NRG), Martelli (UNIFI), Breijder (NRG), Forgione (UNIFI), Roelofs (NRG)

Parallel Session (Core thermal Hydraulics 3)

Chair: Abdalla Batta & Andreas Class

Location: Grote Vergaderzaal

9:40-10:00	S007	Towards Validated Prediction with RANS CFD of Flow and Heat Transport in a Wire-wrap Fuel Assembly	Roelofs* (NRG), Uitslag-Doolaard (NRG), Dovizio (NRG), Mikuz (NRG), Shams (NRG), Bertocchi (TUD), Rohde (TUD), Pacio (KIT), Di Piazza (ENEA), Kennedy (SCK), Van Tichelen (SCK), Obabko (ANL), Merzari (ANL)
10:00-10:20	S069	CFD Verification and Validation of Wire-Wrapped Pin Assemblies	Leonard (Terrapower), Martin (Terrapower), Jackson (Terrapower), Steer* (Terrapower)
10:20-10:40	S026	Validating RANS to Predict the Flow Behavior in Wire-wrapped Fuel Assemblies	Dovizio* (NRG), Mikuz (NRG), Shams (NRG), Roelofs (NRG)

Parallel Session (Vibrations 1)

Chair: Joris Degroote

Location: Grote Lunchkamer

11:10-11:30	S005	Fluid-Structure Interaction of a 7-Rod Bundle: Benchmarking Numerical Simulations with Experimental Data	Bertocchi* (TUD), Rohde (TUD), De Santis (NRG), Shams (NRG), Dolfen (UGENT), Degroote (UGENT), Vierendeels (UGENT)
11:30-11:50	S018	Numerical Simulation of Vortex-induced Vibrations in a 7-Rod Bundle Compared to Experimental Data	Dolfen* (UGENT), Bertocchi (TUD), Rohde (TUD), Degroote (UGENT)
11:50-12:10	S048	One-way Coupled Simulation of FIV in a 7-Pin Wire-wrapped Fuel Pin Bundle	Brockmeyer (TAMU), Merzari* (ANL), Solberg (LLNL), Hassan (TAMU)
12:10-12:30	S028	A Numerical Framework to Simulate Turbulent Flow-induced Vibrations of Nuclear Fuel Rods	De Santis* (NRG), Chouchoulis (NRG), Shams (NRG)

Parallel Session (System and V&V 4)

Chair: Ivan Di Piazza

Location: Auditorium

11:10-11:30	S044	Post-test Simulation of a PLOFA Transient Test in the CIRCE-HERO Facility	Narcisi* (UniRM1), Gianetti (UniRM1), Caruso (UniRM1), Del Nevo (ENEA), Tarantino (ENEA)
11:30-11:50	S045	Experimental Analysis of Stationary and Transient Scenarios of ALFRED Steam Generator Bayonet Tube in CIRCE-HERO Facility	Pesetti (UNIFI), Lorusso (UniRM1), Tarantino* (ENEA), Narcisi (UniRM1), Del Nevo (ENEA), Forgione (UNIFI), Gianetti (UniRM1)
11:50-12:10	S020	Fluent and RELAP5 codes coupled to simulate the HX-HERO operational conditions in CIRCE facility	Forgione (UNIFI), Galleni* (UNIFI), Barone (UNIFI), Ciolini (UNIFI), Martelli (UNIFI), Tarantino (ENEA)
12:10-12:30	R003	Analysis of Argon-Induced Natural Circulation in CIRCE-HERO with SPECTRA Code	Breijder* (NRG), Alcaro (NRG), Stempniewicz (NRG), Roelofs (NRG)

Parallel Session (Core Thermal Hydraulics 4)

Chair: Abdalla Batta & Andreas Class

Location: Grote Vergaderzaal

11:10-11:30	S004	Temperature Profiles in the Blockage Experiment with the BFPS Test Section	Marinari* (UNIFI), Di Piazza (ENEA), Tarantino (ENEA), Martelli (UNIFI)
11:30-11:50	S012	Blockage Fuel Pin Simulator Modelling and Simulation	Marinari* (UNIFI), Di Piazza (ENEA), Tarantino (ENEA), Forgione (UNIFI)
11:50-12:10	S033	Experimental Study of the Influence of Inter-wrapper Flow on Liquid-metal Cooled Fuel Assemblies	Pacio* (KIT), Daubner (KIT), Fellmoser (KIT), Wetzels (KIT)
12:10-12:30	S066	Reduced RANS Approach Validation to Model Passive Heat Removal Due to Inter-wrapper Flow	Mathur* (NRG), Uitslag-Doolaard (NRG), Roelofs (NRG)

Location: Grote Vergaderzaal

12:30-13:30	Lunch
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Keynote

Chair: Elia Merzari
 Location: Auditorium

13:30-14:00	K003	KEYNOTE: Thermal Hydraulics in Liquid Metal Reactors	Vaghetto (TAMU)
14:00-14:20	S065	Thermal-Hydraulics Research Activities for Lead-based Reactor in China	Wu (INEST), Zhou (INEST), Jin (INEST), Sa (INEST), Zhu (INEST), Chen (INEST) Wang* (INEST)

Parallel Session (Vibrations 2)

Chair: Joris Degroote
 Location: Grote Lunchkamer

14:30-14:50	S006	Analysis of the Kelvin-Helmholtz Instability in a Square Cyliner Array Subjected to Axial Flow with LES and URANS	De Moerloose* (UGENT), Verzelen (UGENT), De Ridder (UGENT), Degroote (UGENT)
14:50-15:10	S027	Numerical Simulation of Flow-induced Vibrations of Nuclear Fuel Rod Bundles	De Santis* (NRG), Shams (NRG)
15:10-15:30	U000	Empty Time Slot	

Parallel Session (System and V&V 5)

Chair: Ivan Di Piazza
 Location: Auditorium

14:30-14:50	S038	Development of the HEXACOM Facility for Characterising the Heat Transfer Performance of the MYRRHA PHX in LBE	Rozzia (SCK), Kennedy* (SCK), Mirelli (SCK), Van Tichelen (SCK)
14:50-15:10	S042	MYRRHA Primary Heat Exchanger Experimental Simulations on CIRCE-HERO	Lorusso* (UniRM1), Pesetti (UNIFI), Barone (UNIFI), Castelliti (SCK), Caruso (UniRM1), Forgione (UNIFI), Gianetti (UniRM1), Martelli (UNIFI), Rozzia (SCK), Tarantino (ENEA), Van Tichelen (SCK)
15:10-15:30	S054	Thermal-Hydraulic Analysis of SEALER under Steady-state and UTOP Scenario	Stempniewicz* (NRG), Zwijsen (NRG), Roelofs (NRG), Wallenius (LeadCold), Mickus (LeadCold), Bortot (LeadCold)

Parallel Session (Pool Thermal Hydraulics 1)

Chair: Vincent Moreau
 Location: Grote Vergaderzaal

14:30-14:50	S023	Pool CFD Modelling: Lessons from the SESAME Project	Moreau* (CRS4), Profir (CRS4), Alemberti (ANN), Frignani (ANN), Merli (ANN), Belka (CVR), Frybort (CVR), Melichar (CVR), Tarantino (ENEA), Franke (HZDR), Eckert (HZDR), Class (KIT), Yanez (KIT), Grishchenko (KTH), Jeltsov (KTH), Kudinov (KTH), Roelofs (NRG), Zwijsen (NRG), Visser (NRG), Badillo (PSI), Niceno (PSI), Martelli (UNIP)I)
14:50-15:10	S040	Thermal Hydraulic Experiments in the LBE-Cooled Scaled Pool Facility E-Scape	Van Tichelen* (SCK), Mirelli (SCK)
15:10-15:30	S037	CFD Analyses of the European Scaled Pool Experiment E-Scape	Visser* (NRG), Keijers (SCK), Lopes (VKI), Roelofs (NRG), Van Tichelen (SCK), Koloszar (VKI)

Parallel Session (Fluctuations 3)

Chair: Afaque Shams & Yann Bartosiewicz
 Location: Grote Lunchkamer

16:00-16:20	S001	Status and Perspectives of Turbulent Heat Transfer Modelling in Low-Prandtl Fluids	Shams* (NRG), De Santis (NRG), Koloszar (VKI), Villa Ortiz (VKI), Narayanan (ASCOMP)
16:20-16:40	S017	Numerical Prediction of Flow and Heat Transfer in a Backward Facing Step at Various Prandtl Fluids	Buckingham (VKI), Shams (NRG), Villa Ortiz* (VKI)
16:40-17:00	S031	Assessment of an Implicit Algebraic Heat Flux Model for Low-Prandtl Fluids	Shams* (NRG), De Santis (NRG)
17:00-17:20	U000	Empty Time Slot	

Parallel Session (System and V&V 6)

Chair: Ivan Di Piazza

Location: Auditorium

16:00-16:20	S003	Thermo-Fluid Dynamic Transients in the NACIE-UP Facility	Di Piazza (ENEA), Angelucci (UNIFI), Marinari* (UNIFI), Tarantino (ENEA), Martelli (UNIFI)
16:20-16:40	S021	Post-test simulations for the NACIE-UP benchmark by STH codes	Forgione* (UNIFI), Martelli (UNIFI), Barone (UNIFI), Gianetti (UniRM1), Lorusso (UniRM1), Hollands (GRS), Papukchiev (GRS), Polidori (ENEA), Cervone (ENEA), Di Piazza (ENEA)
16:40-17:00	S013	Post-Test Analysis of NACIE-UP Experiments with Non-Uniformly Heated Fuel Pin Bundle	Barone (UNIFI), Forgione* (UNIFI), Marinari (UNIFI), Martelli (UNIFI), Di Piazza (ENEA), Tarantino (ENEA)
17:00-17:20	S036	NACIE-UP post-test simulations by CFD codes	Forgione (UNIFI), Ambrosini (UNIFI), Lo Frano (UNIFI), Martelli (UNIFI), Pucciarelli* (UNIFI)

Parallel Session (Pool Thermal Hydraulics 2)

Chair: Vincent Moreau

Location: Grote Vergaderzaal

16:00-16:20	S035	CIRCE-ICE PLOHS Experimental Campaign	Martelli* (UNIFI), Tarantino (ENEA), Forgione (UNIFI)
16:20-16:40	S011	CFD Modelling of the CIRCE Facility	Zwijsen* (NRG), Dovizio (NRG), Moreau (CRS4), Roelofs (NRG)
16:40-17:00	S029	Ultrasonic Flow Measurements in Liquid Metal Flows with Partial Solidification	Franke (HZDR), Raebiger* (HZDR), Eckert (HZDR)
17:00-17:20	U000	Empty Time Slot	

17:30		Bus Transport
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19:30		Dinner + Special Event @ Spotlight (Alkmaar)
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Thursday 21 March

Keynote

Chair: Martin Rohde
 Location: Auditorium

9:00-9:30	K005	KEYNOTE: Developments in the US NEAMS Program	Merzari (ANL)
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Parallel Session (Fluctuations 4)

Chair: Afaque Shams & Enrico Stalio
 Location: Auditorium

9:40-10:00	S014	Modelling of the Cover-gas Dynamics in Liquid Metal Fast Reactors	Huang* (U. Sheffield), He (U. Sheffield)
10:00-10:20	S041	Numerical and Experimental Analysis on a Planar Jet with Heated Co-Flow at Medium- and Low-Prandtl Number Values	Cascioli* (SCK), Buckingham (VKI), Villa-Ortiz (VKI), Keijers (SCK), Van Tichelen (SCK), Kenjeres (TUD)
10:20-10:40	S063	Numerical Investigation on Effect of Inlet Velocity for Lead-based Reactor Coolant Temperature Fluctuation in a Coaxial-jet	Wang* (INEST), Lyu (INEST), Jin (INEST), Zhou (INEST)

Parallel Session (Pool Thermal Hydraulics 3)

Chair: Vincent Moreau
 Location: Grote Vergaderzaal

9:40-10:00	S030	An Improved CFD Model for a MYRRHA based Primary Coolant Loop	Moreau* (CRS4), Profir (CRS4), Keijers (SCK), Van Tichelen (SCK)
10:00-10:20	S016	Design and the First Experimental Data from the SESAME Stand for Lead Solidification	Melichar* (CVR), Belka (CVR), Frybort (CVR), Moreau (CRS4), Profir (CRS4)
10:20-10:40	S051	Analysis of the Accuracy of the Modeling of a Heated Pool	Yanez* (KIT), Class (KIT)

Closing Plenary

Chair: Philippe Planquart
 Location: Auditorium

11:00-11:30	K008	KEYNOTE: Impact of LMFR thermal hydraulics R&D on LWR development	Baglietto (MIT)
11:30-12:10	C001	Panel Session: Impact of SESAME on European LMFR design teams	Moderator: Planquart (VKI)
12:10-12:30	C002	Closing Session	Roelofs (NRG), Tarantino (ENEA), Planquart (VKI)

12:30		Lunch
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13:30		Bus Transport
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