

*Specialists Workshop on Advanced Instrumentation and Measurement Techniques
for Experiments Related to Nuclear Reactor Thermal Hydraulics and Severe Accidents*

WORKSHOP PROGRAMME – Rev.1, 16/10/2019

Paper Sessions

Session ID & Colour Code	Session Title	No. of Papers	When	
I-1	<u>Special or Combined Experimental Techniques; SA-specific</u> e.g. aerosol removal, ...	3	Tue 22	11:25-12:40
I-2		4	Thu 24	11:05-12:45
II-1	<u>Conductivity and Impedance Methods</u> including Wire Mesh Sensors	3	Tue 22	14:50-16:05
II-2		4	Thu 24	16:20-18:00
III	<u>PIV - LDA and LIF</u>	4	Tue 22	16:30-18:10
IV-1	<u>Local Single- and Multi-Sensor Probes</u> (optical probes, conductance probes, temperature probes), including optical fibre probes for phase detection and temperature measurement	3	Wed 23	09:50-11:05
IV-2		2	Fri 25	09:15-10:05
V	<u>Flow Visualization Methods</u> including high-speed cameras and Infrared methods, for liquid film thickness and temperature measurement; holographic methods; etc.	4	Wed 23	11:30-13:10
VI	<u>Thermal Anemometry and Anemo-Thermometry</u> including hot-wire and hot-film sensors	2	Wed 23	15:30-16:20
VII-1	<u>Radiographic and Tomographic Methods</u> including X-rays, gamma-rays, neutrons, and electrical impedance tomography	3	Wed 23	16:45-18:00
VII-2		2	Thu 24	15:05-15:55
VIII	<u>Pressure-Based Measurements</u>	2	Thu 24	09:50-10:40

Other Sessions

	Workshop Opening
	Keynote Lecture
	Special Presentation
	Sponsors' Session
	Summary Session – Open Discussion

Workshop Schedule - Tuesday 22nd October (Day I)

8:00	9:00	Registration
9:00	9:20	<p>Workshop Opening</p> <p>Dominique Bestion (WS Chairman), Nusret Aksan (SWINTH OC and SILENCE Chairman), Francesco D'Auria (GRNSPG-UNIPJ), Nils Sandberg (OECD/NEA CSNI/WGAMA representative)</p>
9:20	10:10	<p>Keynote Lecture - I</p> <p><i>"High-fidelity experimental measurements for modeling and simulation of nuclear engineering applications"</i></p> <p>Speaker: Yassin Hassan (TAMU) Session Chair: <i>Nusret Aksan</i></p>
10:10	11:00	<p>Special Presentation</p> <p><i>"Reporting about WGAMA & SILENCE activities: Requirements for validation experiments"</i></p> <p>Speaker: Dominique Bestion Session Chair: <i>Nusret Aksan</i></p>
11:00	11:25	Coffee Break
11:25	12:40	<p>Session I-1</p> <p>Special or Combined Experimental Techniques, SA-Specific</p> <p>Papers: #015, #050, #057 Session Chair: <i>Domenico Paladino</i></p>
12:40	14:10	Lunch
14:10	14:50	<p>Sponsors' Session</p> <p>Session Chair: <i>Sanjeev Gupta</i></p>
14:50	16:05	<p>Session II-I</p> <p>Conductivity and Impedance Methods - Wire Mesh Sensors</p> <p>Papers: #005, #013, #035 Session Chair: <i>Atsushi Ui</i></p>
16:05	16:30	Coffee Break
16:30	18:10	<p>Session III</p> <p>PIV - LDA and LIF</p> <p>Papers: #002, #020, #032, #056 Session Chair: <i>Ralf Kapulla</i></p>

Workshop Schedule - Wednesday 23rd October (Day II)

8:15	9:00	Registration
9:00	9:50	<p style="text-align: center;">Keynote Lecture – II</p> <p style="text-align: center;"><i>“Practical science of “revitalizics” for decommission of Fukushima Dai-ichi nuclear power plant – Innovation with ultrasonic measurement and robotic system – “</i></p> <p>Speaker: Hiroshige Kikura <i>(Tokyo Institute of Technology)</i></p> <p style="text-align: right;">Session Chair: <i>Lionel Rossi</i></p>
9:50	11:05	<p style="text-align: center;">Session IV-1</p> <p style="text-align: center;">Local Single- and Multi-Sensor Probes</p> <p>Papers: #019, #026, #042</p> <p style="text-align: right;">Session Chair: <i>Lionel Rossi</i></p>
11:05	11:30	Coffee Break
11:30	13:10	<p style="text-align: center;">Session V</p> <p style="text-align: center;">Flow Visualization Methods</p> <p>Papers: #011, #025, #039, #058</p> <p style="text-align: right;">Session Chair: <i>Tomoaki Kunugi</i></p>
13:10	14:40	Lunch
14:40	15:30	<p style="text-align: center;">Keynote Lecture – III</p> <p style="text-align: center;"><i>“Advanced instrumentations for nuclear thermal hydraulic experiments in Korea”</i></p> <p>Speaker: Byongjo Yun (PNU)</p> <p style="text-align: right;">Session Chair: <i>Matteo Bucci</i></p>
15:30	16:20	<p style="text-align: center;">Session VI</p> <p style="text-align: center;">Thermal Anemometry and Anemo-Thermometry</p> <p>Papers: #023, #048</p> <p style="text-align: right;">Session Chair: <i>Matteo Bucci</i></p>
16:20	16:45	Coffee Break
16:45	18:00	<p style="text-align: center;">Session VII-1</p> <p style="text-align: center;">Radiographic and Tomographic Methods</p> <p>Papers: #001, #009, #037</p> <p style="text-align: right;">Session Chair: <i>David Novog</i></p>

Workshop Schedule - Thursday 24th October (Day III)

8:15	9:00	Registration
9:00	9:50	<p style="text-align: center;">Keynote Lecture – IV</p> <p style="text-align: center;"><i>“Experimental and numerical studies on high-pressure steam condensation in a horizontal condenser tube”</i></p> <p>Speaker: Sebastian Unger (HZDR) Session Chair: <i>Sevostian Bechta</i></p>
9:50	10:40	<p style="text-align: center;">Session VIII</p> <p style="text-align: center;">Pressure-based Measurements</p> <p>Papers: #010, #012 Session Chair: <i>Sevostian Bechta</i></p>
10:40	11:05	Coffee Break
11:05	12:45	<p style="text-align: center;">Session I-2</p> <p style="text-align: center;">Special or Combined Experimental Techniques, SA-specific</p> <p>Papers: #006, #031, #052, #053 Session Chair: <i>Nourdine Chikhi</i></p>
12:45	14:15	Lunch
14:15	15:05	<p style="text-align: center;">Keynote Lecture – V</p> <p style="text-align: center;"><i>“Outcome of the OECD/NEA HYMERES Project”</i></p> <p>Speaker: Domenico Paladino (PSI) Session Chair: <i>Horst-Michael Prasser</i></p>
15:05	15:55	<p style="text-align: center;">Session VII-2</p> <p style="text-align: center;">Radiographic and Tomographic Methods</p> <p>Papers: #004, #055 Session Chair: <i>Horst-Michael Prasser</i></p>
15:55	16:20	Coffee Break
16:20	18:00	<p style="text-align: center;">Session II-2</p> <p style="text-align: center;">Conductivity and Impedance Methods – Wire Mesh Sensors</p> <p>Papers: #022, #036, #038, #049 Session Chair: <i>Fabio Moretti</i></p>
20:00	23:00	Workshop Banquet

Workshop Schedule – Friday 25th October (Day IV)

8:30	9:15	Registration
9:15	10:05	<p style="text-align: center;"><u>Session IV-2</u> Local Single- and Multi-Sensor Probes</p> <p>Papers: #040, #054 Session Chair: <i>Klaus Umminger</i></p>
10:05	10:30	Coffee Break
10:30	13:00	<p style="text-align: center;">Summary Session – Open Discussion</p> <p>Session Chair: <i>Dominique Bestion</i> Secretariat: <i>Fabio Moretti, Marco Lanfredini</i></p>

List of Papers

#001	Design of an electrical impedance tomography detector for two-phase flow measurements in the PKL experiment <i>Presented by: <u>Chunhui Dang</u>, CEA Cadarache, France</i>
#002	Temperature variations around single nucleate boiling bubble measured with a miniature thermocouple <i>Presented by: <u>Tomoaki Kunugi</u>, Kyoto University, Japan</i>
#004	Spectral and eigenvalues analysis of electrical impedance tomography data for flow regime identification <i>Presented by: <u>Chunhui Dang</u>, CEA Cadarache, France</i>
#005	Defining void fraction with axial wire-mesh sensor in a swirling two-phase flow <i>Presented by: <u>Joonas Telkkä</u>, LUT University, Finland</i>
#006	Review of researches using analogy concept for thermal hydraulic and severe accident experiments <i>Presented by: <u>Bum-Jin Chung</u>, Kyung Hee University, Rep. of Korea</i>
#009	Improvement of high-speed neutron imaging for visualization of reflooding phenomena <i>Presented by: <u>Daisuke Ito</u>, Kyoto University, Japan</i>
#010	Unsteady pressure measurements in 5x5 rods bundle using single and multi-sensors devices <i>Presented by: <u>Lionel Rossi</u>, CEA Cadarache, France</i>
#011	Experiment study on film width and thickness of free falling water film on a large inclined plate <i>Presented by: <u>Po Hu</u>, Shanghai Jiao Tong University, P. R. China</i>
#012	Measurement of corium surface tension using the maximum bubble pressure <i>Presented by: <u>Nourdine Chikhi</u>, CEA Cadarache, France</i>
#013	The void fraction dynamics in vertical rod bundle <i>Presented by: <u>Zhongchun Li</u>, NPIC, P. R. China</i>
#015	Large wall-superheat oscillations in steady, diabatic upward annular flow measured with synchronized IR thermography and liquid film thickness diagnostics <i>Presented by: <u>Matteo Bucci</u>, MIT, USA</i>
#019	Single optical fiber probe method for local droplet parameters in the horizontal stratified and annular flows <i>Presented by: <u>Byeonggeon Bae</u>, Pusan National University, Rep. of Korea</i>
#020	Experimental study on flow structure inside subchannels of 8x24 rod bundle arrays <i>Presented by: <u>Seok Kim</u>, KAERI, Rep. of Korea</i>
#022	Experimental studies and measurement uncertainty estimations of the flow mixing in PWR pressure model <i>Presented by: <u>Alexander Barinov</u>, JSC Afrikantov OKBM, Russia</i>

#023	Experimental study on the heat flux of a heat exchanger for passive cooling of spent fuel pools by temperature anemometry grid sensor <i>Presented by: <u>Sebastian Unger</u>, HZDR, Germany</i>
#025	“Infrared vision”: towards a solution of the heat partitioning controversy in boiling and CHF <i>Presented by: <u>Matteo Bucci</u>, MIT, USA</i>
#026	Error in bubble velocity measurement using 4-sensor void probe due to interface deformation <i>Presented by: <u>Akira Satou</u>, JAEA, Japan</i>
#031	Examination of aerosol removal in steam generator under severe accident condition <i>Presented by: <u>Byeonghee Lee</u>, KAERI, Rep. of Korea</i>
#032	A digital holographic measurement of a sphere-packed pipe by a refractive index-matching method <i>Presented by: <u>Shin-ichi Satake</u>, Tokyo University of Science, Japan</i>
#035	Improvement of TOPFLOW void fraction data using potential field simulations of the wire-mesh sensor response <i>Presented by: <u>Horst-Michael Prasser</u>, ETHZ, Switzerland</i>
#036	Response of electrical film thickness sensors to waves in the liquid film <i>Presented by: <u>Horst-Michael Prasser</u>, ETHZ, Switzerland</i>
#037	Time averaged tomographic measurements of flow conditions before and after dryout in a simplified BWR subchannel geometry <i>Presented by: <u>Lukas Robers</u>, ETHZ, Switzerland</i>
#038	Wire mesh sensor measurements of a co-current two-phase flow in a spent fuel pool-like rack <i>Presented by: <u>Guillaume Brillant</u>, IRSN, France</i>
#039	On oxidation of a zirconium droplet falling in subcooled water <i>Presented by: <u>Qiang Guo</u>, KTH, Norway</i>
#040	Correlations between superficial gap velocities and interfacial velocities for two-phase flows in simulated tube bundle <i>Presented by: <u>Toshifumi Nariai</u>, Mitsubishi Heavy Industries, Japan</i>
#042	Applications of sacrificial thermocouples for various severe accident experiments using high temperature of melt <i>Presented by: <u>Sang Mo An</u>, KAERI, Rep. of Korea</i>
#048	Measurements of void fraction, liquid temperature and velocity under boiling two-phase flows using thermal-anemometry <i>Presented by: <u>Fabrice François</u>, CEA Cadarache, France</i>
#049	Investigation of liquid film thickness distribution in air-water experiment simulating emergency coolant bypass using electrical conductance method <i>Presented by: <u>Hyoung Kyu Cho</u>, Seoul National University, Rep. of Korea</i>

#050	Measurement of forced convection subcooled boiling flow and rod surface temperature distribution <i>Presented by: <u>Atsushi Ui</u>, CRIEPI, Japan</i>
#052	Fundamental study on application of sonoluminescence to chemical elemental analysis <i>Presented by: <u>Hideharu Takahashi</u>, Tokyo Institute of Technology, Japan</i>
#053	FASP - Measuring technique for fog droplets and aerosols <i>Presented by: <u>Gerhard Poss</u>, Becker Technologies, Germany</i>
#054	Thermal radiation effect on thermocouple measurements <i>Presented by: <u>Ralf Kapulla</u>, PSI, Switzerland</i>
#055	Preliminary results on the development of a fast-neutron tomography system for phase distribution measurements <i>Presented by: <u>Garik Patterson</u>, McMaster University, Canada</i>
#056	Dynamic measurements of the flow and structure oscillations to validate FSI calculations <i>Presented by: <u>Evgeny Shmelev</u>, JSC Afrikantov OKBM, Russia</i>
#057	The use of a novel gradient heat flux sensor for characterization of reflux condensation <i>Presented by: <u>Filip Janasz</u>, ETHZ, Switzerland</i>
#058	Hydrodynamic aspects of melt jet breakup in fuel-coolant interactions <i>Presented by: <u>Kwang-Hyun Bang</u>, Korea Maritime and Ocean Univ., Rep. of Korea</i>
