



INTERNATIONAL ATOMIC ENERGY AGENCY

**TECHNICAL MEETING
ON
'HEAT TRANSFER, THERMAL-HYDRAULICS and SYSTEM
DESIGN FOR SUPER-CRITICAL WATER-COOLED REACTORS'**

July 5-8, 2010



UNIVERSITÀ DI PISA
University of Pisa, Pisa, Italy

AGENDA

Monday July 5, 2010		
08:30 – 09:00 Registration		
Opening Session Chairpersons: N. Aksan, Switzerland and S. Bilbao y León, IAEA		
09:00 – 09:10	Opening	S. Bilbao y León, IAEA
09:10 – 09:30	Welcome Addresses	U of Pisa: E. Giaccherini CIRTEN: G. Forasassi ENEL: S. Pasini ENEA: F. Bianchi
9:30 – 9:50	IAEA Presentation: "Overview of IAEA Activities in the Area of SCWRs"	S. Bilbao y León, IAEA
09:50 – 10:30	Specialists Meeting (SM) Opening Lecture- TM01, Evaluation of a new equation for variable property mixed convection heat transfer in vertical tubes	J.D. Jackson, UK
10:30 – 11:00	Coffee Break	
1st Meeting of International Specialists on Supercritical Pressure Heat Transfer and Fluid Dynamics Session SM1 - Chairpersons: J.D. Jackson and P.X. Jiang		
11:00 – 11:45	TM02, Investigation of the Effectiveness of Jackson's Nusselt Correlation with Buoyancy and Acceleration Terms in Critical Water	M. Anderson, USA
11:45 – 12:30	TM03, Mixed Convection Heat Transfer to Carbon Dioxide Flowing Upward and Downward in a Vertical Tube and an Annular Channel	Y.Y. Bae, Korea
12:30 – 14:00	Lunch	
14:00 – 14:45	TM04, Convection Heat Transfer of CO ₂ at Supercritical Pressure in Vertical Small, Mini and Micro Tubes	P.X. Jiang, China

14:45 – 15:30	TM05, Analytical Modelling of the Heat Transfer to Supercritical Water in Pipe Flows	E. Laurien, Germany
15:30 – 16:00	Coffee Break	
16:00 – 16:45	TM06, CFD Prediction of the Onset of Heat Transfer Deterioration to Supercritical Water	H. Anglart, Sweden
16:45 – 17:30	TM07, Liquid-vapor phase separation during a sudden quench of a supercritical fluid	R. Mauri, Italy
17:30 – 18:15	TM08, Numerical Simulation of Heat Transfer of CO ₂ at Supercritical Pressure using various Turbulence Models	C. R. Zhao, China
Tuesday July 6, 2010		
1st Meeting of International Specialists on Supercritical Pressure Heat Transfer and Fluid Dynamics		
Session SM2 - Chairpersons: S. He and W. Ambrosini		
9:00 – 9:45	TM09, Assessment of Turbulence Models in the Simulation of Heat Transfer to Water at Supercritical Pressure in Upward and Downward Flow	M. Mucci, Italy
9:45 – 10:30	TM10, Evaluation of Heat Transfer Coefficient of Supercritical Water Flowing Inside a Tube Using CFD Code TM11, Review of Heat Transfer Behavior in Supercritical Water Cooled Reactor	Dr. S.K. Dubey, India
10:30 – 11:00	Coffee Break	
11:00 – 11:45	TM12, Effects of body force and variable properties on the performance of turbulence models	S. He, UK
11:45 – 12:30	TM13, Experimental Studies on Critical Flow and Heat Transfer of Water for Near-critical and Supercritical pressures	Y. Chen, China
12:30 – 14:00	Lunch	
14:00 – 14:45	TM14, Investigation of heat transfer behavior in turbulent, horizontal flows near the critical pressure	A. Krizenga, USA
14:45 – 15:30	TM15, CATHENA Simulation of Supercritical Heat Transfer in a Tube	B.N. Hanna, Canada
15:30 – 16:00	Coffee Break	
Technical Meeting on Heat Transfer, Thermal-Hydraulics and System Design for Super-Critical Water-Cooled Reactors		
Session TM1: Design Concepts		
Chairpersons: M. Podowski and M. Rohde		
16:00 – 16:45	Technical Meeting (TM) Opening Lecture TM16, Design Principles and Features of Supercritical Water-cooled Reactors to Meet Design Goals of Generation-IV Nuclear Reactor Concepts	R. Duffey, Canada
16:45 – 17:30	TM17, Thermal Core Design of a High Performance Light Water Reactor	T. Schulenberg, Germany
17:30 – 18:15	TM18, Current Status of Research and Development of Supercritical Water Cooled Fast Reactor (Super Fast Reactor) in Japan	T. Nakatsuka, Japan
18:15 – 19:00	TM19, Super-Critical Water-Cooled Nuclear Reactor (SCWR) Concepts: Thermodynamic Cycles and Thermal Aspects of Pressure-Channel Design	I. Pioro, Canada
19:30 – 22:00	Social Event hosted by University of Pisa and IAEA	

Wednesday July 7, 2010		
Technical Meeting on Heat Transfer, Thermal-Hydraulics and System Design for Super-Critical Water-Cooled Reactors		
Session TM2: Stability and Natural Circulation		
Chairpersons: T. Schulenberg and L. Leung		
09:00 – 09:45	TM20, Dimensionless Analysis in Support to Stability Predictions in Heated Channels with Supercritical Fluids at Imposed Heating Flux and Wall Temperature Conditions	W. Ambrosini, Italy
09:45 – 10:30	TM21, Stability Analysis of Generation IV Supercritical Water Reactors	M. Podowski, USA
10:30 – 11:00	Coffee Break	
11:00 – 11:45	TM22, Experimental and Theoretical Investigations on Steady State and Stability Behaviour of Natural Circulation Systems Operating with Supercritical Fluid	M. Sharma, India
11:45 – 12:30	TM38, Non-Dimensional Parameters for Static and Oscillatory Instability in Supercritical Parallel-Channel Systems	V. Chatoorgoon, Canada
12:30 – 14:00	Lunch	
Technical Meeting on Heat Transfer, Thermal-Hydraulics and System Design for Super-Critical Water-Cooled Reactors		
Session TM3: Experiments and Computations (1)		
Chairpersons: J. Piore and Y. Y. Bae		
14:00 – 14:45	TM24, Thermohydraulics of the VVER-SCP Single-pass Core, Hydro-profiling and Stability	A. Churkin, Russia
14:45 – 15:30	TM25, Preliminary natural circulation data of a scaled SCWR experiment	C. T'Joel, Netherlands
15:30 – 16:00	Coffee Break	
16:00 – 16:45	TM26, Summary for a Numerical Simulation on a HPLWR Fuel Assembly Flow with Wrapped Wire Spacers	A. Kiss, Hungary
16:45 – 17:30	TM27, Investigation of Flow and Heat Transfer of Fuel Assembly in Supercritical Water Nuclear Reactor	Z. Shang, UK
17:30 – 18:15	TM28, Subchannel Analysis of Wire Wrapped SCWR Assembly	J. Yang, China
Thursday July 8, 2010		
Technical Meeting on Heat Transfer, Thermal-Hydraulics and System Design for Super-Critical Water-Cooled Reactors		
Session TM4: Experiments and Computations (2)		
Chairpersons: X. Cheng and A. Kiss		
09:00 – 09:45	TM29, Supercritical Water: On a road from CFD to NPP simulations	L. Rintala, Finland
09:45 – 10:30	TM30, Some Problems of Fluid-Dynamics and Heat Transfer in SCWRs with Rod-Bundle Cores	A. Sedov, Russia
10:30 – 11:00	Coffee Break	
11:00 – 11:45	TM31, New Supercritical Water Loop in Nuclear Research Institute REZ, PLC – Description and First Operation Experience	R. Vsolak, Czech Rep.
11:45 – 12:30	TM32, Low Temperature Cycles with Supercritical Fluids for Nuclear Plants	P. Hayek, Czech Rep.
12:30 – 14:00	Lunch	

Technical Meeting on Heat Transfer, Thermal-Hydraulics and System Design for Super-Critical Water-Cooled Reactors Session TM5: Experiments and Computations (3) Chairpersons: L. Ammirabile and A. Churkin		
14:00 – 14:45	TM33, Study of Thermal-Hydraulics on SCWR in Nuclear Power Institute in China	C. Lu, China
14:45 – 15:30	TM34, Simulation of Large-break LOCA in the HPLWR	J. Kurki, Finland
15:30 – 16:00	<i>Coffee Break</i>	
16:00 – 16:45	TM35, RELAP5/Mod3.3 and TRACE5.0 predictions of heat transfer and stability for supercritical water flow in heated pipe.	F. Fiori, Italy
16:45 – 17:30	TM36, Some Pertinent Aspects of COMENA R/D Activities in the Field of SCWR	B. Meftah, Algeria
17:30 -18:15	TM37, Roadmap for conceptual design of a supercritical pressure water reactor in SNERDI	W. Zhang, China
18:15 – 18:45	Meeting Closure	N. Aksan, Switzerland, R. Duffey, AECL, Canada, J.D. Jackson, UK

Friday July 9, 2010

Technical Tour to the ENEA Brasimone Centre

8:00	Departure from the Faculty of Engineering
17:00	Return to the Faculty of Engineering