WRFPM2023

2023 WATER REACTOR FUEL PERFORMANCE MEETING

PROGRAM

July 17-21, 2023

Xi'an,China

CONTENTS

WELCOME MESSAGE

Dear Colleagues,

On behalf of the Organizing Committee, it is my great pleasure to welcome you to the 2023 Water Reactor Fuel Performance Meeting(WRFPM2023) with the theme “Fuel for Nuclear energy， Innovation for sustainable Development”. Hope you may enjoy your stay here in the beautiful city of Xi’an, China.

The Water Reactor Fuel Performance Meeting(WRFPM) held in Asia is combined with the TopFuel held in Europe and the LWR Fuel Performance held in the United States to form the most influential conference in the field of nuclear fuel research in the world. WRFPM2023 is organized by Chinese Nuclear Society(CNS) in cooperation with the Atomic Energy Society of Japan(AESJ), the Korean Nuclear Society(KNS), the European Nuclear Society(ENS), the American Nuclear Society(ANS),the International Atomic Energy Agency(IAEA) and with support of China Nuclear Energy Industry Corporation(CNEIC)and TVEL.

The WRFPM2023 conference will include Opening and Keynote Session, Technical Plenary Session, Technical Sessions, Technical Tour and Cultural Tour. In our Opening and Keynote Session we have been fortunate to have prominent officials, leading scholars, industry leaders participate and provide their valuable perspectives on water reactor fuel issues.

The technical tracks will cover all issues in the field of fuel performance research, including advances in water reactor fuel technology and testing, operation and experience, transient and off-normal fuel behavior and safety related issues, fuel cycle, used fuel storage and transportation, innovative fuel and related issues, fuel modelling, analysis and methodology.

I would like to express my sincere thanks to the reviewers for ensuring the high quality of the technical papers. Special thanks are extended to the sponsors. Finally, we show high regard to all the authors, speakers in the technical sessions. All the participants are the major contributors to the success of the conference.

In the end, on behalf of all committee members, I cordially invite all of you to participate and support WRFPM2023 activities. Together, we will witness the success of this energetic, diverse and comprehensive event.

WRFPM2023 Conference Chair
CNS President

CONFERENCE SCHEDULE

WRFPM2023 schedule

July 17	10:00-18:00	**Registration-- Shaanxi Great Hall Lobby**
	18:30-20:30	**Reception (** Pomegranate Hall, 2F, building 18**)**
July 18		**Opening and Keynote Session** **Room 2-6** **Chair:** Jianqiao LIU, Vice President and Secretary General of Chinese Nuclear Society
	09:00-09:15	Welcome Remark
	09:15-10:15	Keynote Speech
	10:15-10:35	Break
	10:35-11:55	Keynote Speech
	12:00-13:30	**Lunch time** (1F restaurant, building 18)
	14:00-16:30	**Technical Plenary Session** **Room 2-6** **Chair:** Yongjun JIAO, WRFPM 2023 Technical Program Chair
	16:30-17:00	**Discussion**
July 19		**Technical Sessions**
	09:00-11:40	Track1 - Advances in water reactor fuel technology and testing (Session 1-1, 1-2) , R2-7 Track 3 - Transient and off-normal fuel behavior and safety related issues (Session 3-1, 3-2), R2-8
	12:00-13:30	**Lunch time** (1F restaurant, building 18)
	14:00-15:40	Track 1 - Advances in water reactor fuel technology and testing (Session1-2, 1-3) , R2-7
	16:00-17:40	Track 2 - Operation and experience (Session 2-1), R2-7
	14:00-15:00	Track 3 - Transient and off-normal fuel behavior and safety related issues (Session 3-3), R2-8
	15:20-17:40	Track 4 Fuel cycle, used fuel storage and transportation, R2-8
	18:30-21:00	**Banquet** (Pomegranate Hall, 2nd Floor, Building 18)
July 20		**Technical Sessions**
	09:00-11:00	Track 2 - Operation and experience (Session 2-2), R2-7
	09:00-12:20	Track 6 - Fuel modelling, analysis and methodology (Session 6-1,6-2), R2-8
	11:20-12:20	Track 5 - Innovative fuel and related issues (Session 5-1), R2-7
	12:00-13:30	**Lunch time** (1F restaurant, building 18)
	14:00-17:20	Track 5 - Innovative fuel and related issues (Session 5-2,5-3), R2-7 Track 6 - Fuel modelling, analysis and methodology (Session 6-3,6-4),R2-8
July 21		**Technical Tour, Cultural Tour**

ORGANIZATION

Conference Chair	Shoujun WANG	President of Chinese Nuclear Society
Conference Co-Chair	Xiaogang XUE	President of China Nuclear Energy Industry Corp.

Executive Committee

Role	Name	Position, Co. or Institute
Chair	Jianqiao LIU	Vice President and Secretary General of CNS
Co-Chair	Mu LIU	Chief Accountant of China Nuclear Energy Industry Corp.
Members	Yanyan ZHU	Vice Director , Department of Academic and International Affairs, CNS
	Xinyu XU	China Institute of Atomic Energy
	Xiaoluo WANG	Nuclear Power Institute of China
	Kan Sakamoto	Nippon Nuclear Fuel Development CO., LTD.
	Seiichi Watanabe	Mitsubishi Nuclear Fuel. Co., Ltd.
	Ho Cheol SHIN	The Head of Central Research Institute and Vice President, Central Research Institute KHNP
	Jae Don CHOI	Executive Vice President and Chief Technology Officer, KEPCO Nuclear Fuel

Steering Committee

Role	Name	Position, Co. or Institute
Chair	Qi LUO	Member of the Chinese Academy of Engineering (CAE)
Members	Jianqiao LIU	Vice Presidnt and Secretary Genral, Chinese Nuclear Society
	Jae Ho YANG	Principal Researcher, Korea Atomic Energy Research Instititue
	Hyun Gil KIM	Director of division, Korea Atomic Energy Research Instititue
	Jinzhao ZHANG (he/him)	Tractebel (ENGIE)
	Nico Vollmer (he/him)	Framatome

Technical Program Committee

TPC Chair	Yongjun JIAO	Nuclear Power Institute of China

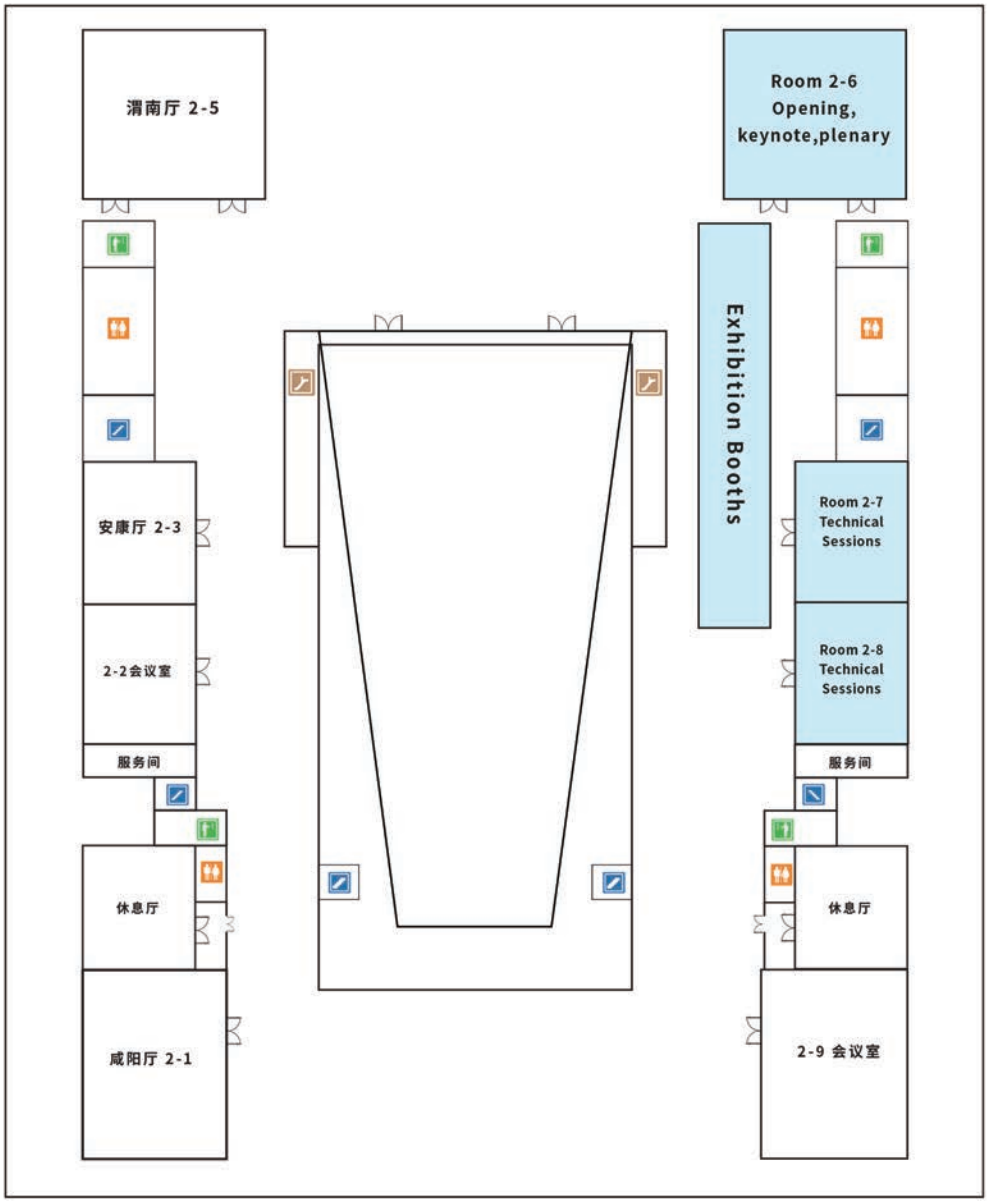
Track	Role	Name	Company
Track 1 -Advances in water reactor fuel technology and testing	Chair	Xiaomin WANG	Nuclear Power Institute of China
	Co-chairs	Fujun GAN	Shanghai Nuclear Engineering Research and Design Institute
		Zhenbing CAI	Southwest Jiaotong University
		Vladimir NOVIKOV	JSC VNIINM,Rosatom
		Oleg KHOMYAKOV	JSC VNIINM,Rosatom
		Yuemin ZHO	China Nuclear Power Technology Research Institute Co.,Ltd
		Ki Seob Sim	International Atomic Energy Agency
		Britta Helmerson	Westinghouse(Europe)
		Jeffrey Bradfute	Westinghouse
		Manuel Quecedo	ENUSA, Spain
Track 2 -Operation and experience	Chair	Guoliang ZHANG	China Nuclear Power Technology Research Institute Co.,Ltd
	Co-chairs	Nico Vollmer	Framatome
		Songtao JI	China Institute of Atomic Energy
		Junji Matsunaga	Global Nuclear Fuel - Japan Co., Ltd.
		Nicolas Waeckel	EDF, Electricite De France
		Nadine Hollasky	Pysics Bel V
Track 3 -Transient and off-normal fuel behavior and safety related issues	Chair	Libing ZHU	Shanghai Nuclear Engineering Research and Design Institute
	Co-chairs	Sichao TAN	Harbin Engineering University
		Yuanming LI	Nuclear Power Institute of China
		Shigeru Kurematsu	Nuclear Development Corporation
		Alexey GUSEV	TVEL, Rosatom
		Anton KRUPKIN	JSC VNIINM,Rosatom
		Oliver Marchand	IRSN, Institute for Radioprotection and Nuclear Safety
		Joosuk LEE	Korea Institute of Nuclear Safety

Track	Role	Name	Company
Track 4 -Fuel cycle, used fuel storage and transportation	Chair	Joakim Lundström	President Fuel & Materials Technology and Managing Director Studsvik Nuclear AB
	Co-chairs	Yongdeog KIM	Korea Hydroelectric and Nuclear Power Co., Ltd
		Guangyu YANG	CNNC North Nuclear Fuel Element Co., Ltd
		Hanyang GU	Shanghai Jiaotong University
Track 5 -Innovation fuel and related issues	Chair	Hua DENG	CNNC Jianzhong Nuclear Fuel Co., Ltd.
	Co-chairs	Ping CHEN	Nuclear Power Institute of China
		Dong-Joo KIM	Korea Atomic Energy Research Institute
		Chenyang LU	Xi`an Jiaotong University
		Xiaoqiang LI	Northwestern Polytechnical University
		Ilya USHMAROV	TVEL, Rosatom
		Cristina MUNOZ-REJA RUIZ	ENUSA, Spain
Track 6 -Fuel modelling, analysis and methodology	Chair	Jinzhao Zhang	Tractebel, ENGIE
	Co-chairs	Yingwei WU	Xi`an Jiaotong University
		Wenjie LI	Nuclear Power Institute of China
		Paul Van Uffelen	European Comission- Joint Research Center
		Zengping PU	Nuclear Power Institute of China
		Marco Cherubini	NINE Nuclear and Industrial Engineering Srl
		Jerome Bigot	Framatome
		Hyo Chan KIM	Korea Atomic Energy Research Institute
		Pau Aragon	CIEMAT, Unit of Nuclear Safety Research,
		Alejandro Soba	National atomic energy commission,Agentina
		Nathan Capps	Oak Ridge National Laboratories
		Katalin Kulacsy	Centre of Energy research
		Feria Marquez Francisco	CIEMAT, Unit of Nuclear Safety Research,

SITE MAP


Zhangba 4# road
Shaanxi Great Hall (WRFPM 2023 Venue)
Building 18
Office building
Zhangba North Road
Zhangba East Road
Building 9
Auditorium
Building 10
Building 10 restaurant
Tennis Stadium
VIP Building
Building 12
Building 19
Zhangba East Road

WRFPM2023 FLOOR MAP



GENERAL INFORMATION

REGISTRATION

The WRFPM2023 registration desk is located in the entrance hall of the conference venue. The open hours are as follows:

9:00-19:00	Monday, July 17
8:15-18:00	Tuesday, July 18
8:30-17:40	Wednesday, July 19
8:30-17:40	Thursday, July 20

NAME BADGES

Please wear your name badge at all times. Admission to all conference functions will be by the badges only (unless noted otherwise). Your badge also provides a helpful introduction to other attendees.

MEAL COUPONS

All attendees will have coupons that allow their entrance to the Conference Reception, Banquet and Lunches. For the conference registered attendees, lunches（Sponsored by Framatome）are supplied during lunch time from July 18th to 20th.
Attendees may refer to the information on the coupons for places of the Conference Reception, Banquet and Lunches.

WELCOME RECEPTION

July 17(Mon) 18:30-20:30 Pomegranate Hall, 2F, building 18

Welcome Reception for WRFPM2023 will be held from 18:30 to 20:30 on Monday. July 17. Please take this opportunity to view and network with our corporate sponsors and exhibitors. Enjoy socializing with your fellow attendees and conference organizers. Tickets for Welcome Reception are required(Included in full registration).

CONFERENCE BANQUET

July 19(Wed) 18:30-21:00 Pomegranate Hall, 2F, building 18

WRFPM2023 Banquet will be held from 18:30 to 21:30 on Wednesday, July 19.We have carefully prepared the menu in the hope that you will enjoy the cuisine. Tickets for Banquet are required(Included in full registration).

COFFE BREAK

Coffee breaks will be provided during the conference at the the 2nd floor. Coffee, tea, water, and light snacks will be available. Refresh yourself with coffee.

REGISTRANTS WITH DISABILITIES

Whenever possible, we are pleased to make arrangements for registrants with disabilities.Advance notice may be required for certain requests. For on-site assistance, please visit the registration desk in the entrance hall and ask conference representatives.

CONFERENCE PROCEEDINGS

The official WRFPM2023 Proceedings is planned to be released 3-4 months after the conference, the WRFPM2023 Proceedings only includes the Final Papers in the category of Technical Publication. If the paper is not presented by the author during the conference, it will not be included in the WRFPM2023 Proceedings. The Engineering Indexes will be given to the papers included in the WRFPM2023 proceedings 1-3 months after publishing.

QUESTIONS ABOUT THE MEETING

If you have any questions or need assistance, please contact staffs at the registration desk in the entrance hall of the conference venue.

WRFPM2023

JULY 18

OPENING, KEYNOTE AND PLENARY SESSIONS

OPENING & KEYNOTE SESSION

July 18	**Opening and Keynote Session** **Room 2-6** **Chair:** Jianqiao LIU, Vice President and Secretary General of Chinese Nuclear Society			
	09:00-09:15	**Welcome Remarks**	Shoujun WANG	President of Chinese Nuclear Society
			Wenjun MA	Vice President of China National Nuclear Corporation
	09:15-09:35	**Keynote Speech**	Jianke SU	Project Officer, Department of Systems Engineering, China Atomic Energy Authority
	09:35-09:55		Ki Seob Sim	Nuclear Fuel Engineering Specialist, of the Nuclear Fuel Cycle and Materials Section, Division of Nuclear Fuel Cycle and Waste Technology, International Atomic Energy Agency
	09:55-10:15		Masahiko OSAKA	Deputy Director General, Nuclear Science and Engineering Center, Japan Atomic Energy Agency
	10:15-10:35	**Break**		
	10:35-10:55	**Keynote Speech**	Hyun-gil KIM	The head of the LWR Fuel Technology Research Division, Korea Atomic Energy Research Institute
	10:55-11:15		Steven A. Arndt	Immediate Past President, American Nuclear Society
	11:15-11:35		Nico VOLLMER	ENS Board Member
	11:35-11:55		Lionel Gaiffe	Fuel Business Unit Senior Executive Vice President, Framatome
	12:00-13:30	**Lunch time**		

WELCOME REMARKS

Shoujun WANG

The president of Chinese Nuclear Society

Brief introduction

Mr. WANG is currently the president of Chinese Nuclear Society.

Before serving as the president of CNS, Mr WANG Shoujun was the Chairman of the China National Nuclear Corporation (CNNC) in December 2016. Mr WANG has more than 40 years of proven performance within China's nuclear industry. His previous appointments include, Chairman of the China Nuclear E&C Group (CNEC); Vice President of CNNC, responsible for overall management of nuclear plant constructions. Prior to that, Mr Wang held various lead positions in CNNC covering engineering and project management, outage and work controls, and operations.Mr Wang was also the General Manager of Shanghai Manager Department and Deputy General Manager of China Nuclear Industry 22nd Construction Co., LTD. Once was the General Manager of Qinshan II Project for Nuclear Engineering and Construction, he was in charge of the multibillion-dollar new-nuclear expansion program.

Mr Wang has a Bachelor's degree from Tianjin University and a Master's degree in Economics Management from the Party School of the Central Committee of CPC.

Mr. Ma Wenjun

Vice-president, CNNC

Brief introduction

Graduated from Lanzhou University in Applied Chemistry (1989), pursued a doctoral degree in Energy and Environmental Protection from Tsinghua University (2018). Current position is Vice-President of China National Nuclear Cooperation (CNNC), executive member of Chinese Nuclear Society, with wide range of experience from nuclear fuels manufacturing, nuclear chemical engineering, and chemical analysis.

1989-2017, he was firstly assigned as engineer of China North Nuclear Fuel Co., Ltd (CNNFC). Throughout his career, he played a vital role in development of various nuclear fuels (research reactors, M310, AP1000, CANDU 6, & HTR fuels etc.) in China. In 2012, he was assigned as president of CNNFC.

In 2017, he took charge of president of China Nuclear Fuel Co., Ltd (CNFC).

2017-2020, he filled the role of head of department, CNNC.

In 2020, he was assigned as Vice-President of CNNC.

KEYNOTE SPEECH

Jianke SU

Project Officer, Department of Systems Engineering, China Atomic Energy Authority

Brief introduction

In 2018, he graduated from Harbin Engineering University.

From August 2018 to July 2022, he served as Assistant engineer and engineer of Nuclear Technology Support Center of China Atomic Energy Authority.

Since August 2022, he has been a project officer of the System Engineering Department of China Atomic Energy Authority.

Ki Seob Sim

Nuclear Fuel Engineering Specialist，IAEA (International Atomic Energy Agency)

Brief introduction

- Ph.D. in nuclear engineering, Korea Advanced Institute of Science and Technology (KAIST)

- Work for the IAEA (International Atomic Energy Agency) as Nuclear Fuel Engineering Specialist since 2014, following more than 30-years' experience in nuclear industry in Korea and Canada.

Presentation abstract

The IAEA has supported power-reactor fuel technologies for many decades (since 1970's) by providing platforms to exchange information and perform research activities at international level, and by documenting best practices and case studies, etc.

In the presentation, on-going programmes and near-term plan of the IAEA to support the use of advanced fuels in operating and innovative power reactors are introduced. This includes IAEA support for accident tolerant and advanced technology fuels (ATF), for high burnup fuels, for fuelling reactors with used fuels and recycled/muti-recycled fuels, for advanced fuels for small modular reactors (SMR), micro modular reactors (MMR) and innovative power reactors and their qualification issues.

Member countries can benefit from attending IAEA's topical meetings, reading IAEA technical documents and contributing to coordinated research projects (CRPs) that usually deal with cutting-edge technologies. To make it possible, the IAEA requires the active involvement of Member States in its activities.

Speech Topic **IAEA Activities to Support the Use of Advanced Nuclear Fuels in Operating and Innovative Power Reactors**

Masahiko OSAKA

Deputy Director General
Nuclear Science and Engineering Center (NSEC)
Japan Atomic Energy Agency (JAEA)

Brief introduction

2023 Apr.-: Vice-chair of the subcommittee on Nuclear Fuel, AESJ

Masahiko Osaka has worked in the field of fundamental research on nuclear fuel materials. Main research fields are high temperature chemistry of advanced fuels, chemical behavior of fission products under severe accident of light water reactor and Accident Tolerant Fuels.

Career:
1995 Apr.:Researcher, fuel characterization for Minor Actinide-bearing oxide fuel for fast reactor
2001 Jun.:Visiting researcher for irradiation program of MA-bearing fuel Cadarache Center, Commissariat à l'énergie atomique
2006 Sep.:Ph. D, Nuclear Engineering, Osaka University
2012 Apr.:Group Leader, Fuels and Materials Property Group,
Oarai Fukushima Project Team
2015 Apr.:Group Leader, Development Group for LWR Advanced Technology,Nuclear Science and Engineering Center
2019.Jul.:Division Head, Fuels and Materials Engineering Division,Nuclear Science and Engineering Center
2023.Apr.:Deputy Director General,Nuclear Science and Engineering Center

Presentation abstract

Overview of R&D on nuclear fuels conducted in Japan are reviewed. After the accident of Fukushima Daiichi Nuclear Power Station (1F), Japanese nuclear fuel R&D has been promoted with focus on the safety enhancement and improvement. In particular, R&D considering the correspondences to both the LWR accident and 1F decommissioning have been of main concern. Among them, R&D for accident tolerant fuel are proceeding by all related Japanese steak holders utilizing international cooperation. Fuel safety research at Japan Atomic Energy Agency (JAEA) as the technical support organization for the nuclear regulation consists of those covering normal operation to the beyond design-basis accident. Overview of the current studies on loss of coolant accident and reactivity-initiated accident are introduced. On the other hand, a fundamental study on fission product (FP) chemistry is also being conducted in JAEA towards the improved source term both for the LWR safety enhancement and 1F decommissioning issues. An innovative nitride fuel is being investigated, considering the wider application as a high-performance fuel. Study in Central Research Institute of Electric Power Industry on the fuel degradation and relocation is mentioned. Various fundamental studies in Japanese universities on fuel, cladding and debris/FPs have been conducted.

Keywords: nuclear fuel R&D, safety enhancement, 1F decommissioning

Speech Topic OVERVIEW OF R&D ON NUCLEAR FUELS IN JAPAN

Hyun-gil KIM

The head of the LWR Fuel Technology Research Division,
Korea Atomic Energy Research Institute

Brief introduction

Education:

-2004. Ph.D. Laser Processing Laboratory, Department of Metallurgical Engineering, Yonsei Univeristy, Seoul, Korea

-1999. M.S. Phase Transformation Laboratory, Department of Materials Engineering, Chungbuk Univeristy, Chungbuk, Korea

Work Experience:

2004 ~ current, working at the KAERI

Dr. Kim currently works at the LWR fuel technology division. Hyun-Gil does research in materials engineering and 3D laser printing (Additive Manufacturing). His current project is advanced fuel development for LWR (Accident Tolerant Fuel) and additive manufacturing technology development for nuclear application.

He has more than 70 patents and 100 research papers through nuclear research for 20 years.

Research Backgrounds:

Details of my research background include:

The development of Zr-based alloys having a good corrosion and creep resistance

Characterization of structure and chemistry of Zr-based alloys and Zirconia using X-ray, SEM and TEM

Irradiation test and analysis of Zr-based alloys

Coating and surface modification technology development using PVD and AM for ATF development

AM technology development of materials and components applied in extreme environments

Presentation abstract

Research to improve the safety and economic feasibility for operating nuclear power plants has ongoing for a long time. In particular, after the Fukushima accident in 2011, research to develop accident tolerant fuel (ATF) has been conducted, and it is also mentioned in EU taxonomy. The development of ATF has been conducted for more than 10 years in the nuclear power plant operating country. ATF combines advanced technology (coating, 3D printing et al.) beyond the existing technology such as alloy design and microstructure control by manufacturing. Regarding the ATF cladding development, various studies have been performed to improve oxidation resistance by using coating technology, Fe alloy and SiC material application, as well as, to improve deformation resistance at high temperature by using oxide dispersion strengthening technology, Mo or SiC material application. As research progresses, coating technology is being established as a target for short-term commercialization in consideration of economic feasibility, compatibility, and application time. The KAERI has developed a coating technology to improve high-temperature oxidation resistance and oxide dispersion strengthened (ODS) technology to improve high-temperature deformation resistance with the concept of accident tolerant fuel cladding. In this way, combining the coating and ODS technology to improve the performance of the zirconium alloy surface can be defined as a surface modification technology. Performance improvement by ATF development is pursing nuclear economics by improving nuclear fuel efficiency in connection with an increase in enrichment. However, the current coating technology has limit in case of a severe accident over than 1200oC. Therefore, it is necessary to challenge the development of materials and manufacturing technology that can secure safety during the severe accident and have manufacturing economy

Speech Topic ATF Development using Advanced Technology and Future Challenges of Fuel

Steven A. Arndt

Ph.D., P.E
Immediate Past President 2022-2023,ANS

Brief introduction

Steven Arndt is an internationally recognized expert in the field of nuclear engineering with experience in nuclear power plant simulation, severe accident analysis and nuclear power plant instrumentation and control. In his 40 years in the nuclear industry Dr. Arndt has worked as a researcher, educator, consultant, and regulator including extensive experience in Russia and Ukraine leading the United States support programs to the states of the former Soviet Union following the Chernobyl accident and as part of the Nuclear Regulatory Commission's (NRC's) response to the Fukushima accident. Dr. Arndt currently serves as a Distinguished Scientist at the Oak Ridge National Laboratory where his research involves advance reactor design readiness. Previously he spent 31 years as a senior scientist with the NRC, leading key research efforts and providing authoritative advice to NRC management and staff in the areas of digital instrumentation and control, software reliability, emergency response, cyber security and numerous other technical areas. Prior to his work at the NRC, Dr. Arndt was a Professor at the U.S. Naval Academy. Additionally, Dr. Arndt serves as an Adjunct Professor of Nuclear Engineering at the University of Tennessee. In 2012 Dr. Arndt was named the Federal Engineer of the Year by the National Society of Professional Engineers, the first nuclear engineer to ever be awarded this honor. In 2020 Dr. Arndt was awarded the "NSPE Award" the highest honor given specifically to a professional engineer. Dr. Arndt holds a B.S. in engineering physics and a M.S. and Ph.D. in nuclear engineering all from The Ohio State University, where he was honored by the faculty of the College of Engineering in 2004 as a Distinguished Alumnus. Dr. Arndt also holds a M.S. in reliability engineering from the University of Maryland. Dr. Arndt is a Fellow of the American Society of Mechanical Engineers (ASME), the American Nuclear Society (ANS), the Association for the Advancement of Science (AAAS), the American Society for Quality (ASQ) and the National Society of Professional Engineers (NSPE) Dr. Arndt is a registered professional engineer in Tennessee and Maryland and was appointed by the Governor of Maryland in 2006 to the Maryland Board for Professional Engineers, where he served for fifteen years (Three years as Chairman). He has served in leadership roles in a number of professional societies especially ANS. He has served as the ANS Treasurer and as a member of its Board of Directors. He served as the 68th President of ANS from 2022-2023.

Presentation abstract

Dr. Arndt will discuss the opportunities presented by the new reactor designs that cut across technologies, sizes, and target applications. He will discuss the need for nuclear technology to address key challenges facing the world today, including climate change, energy security and energy poverty. Dr. Arndt will also provide his insights on some of the key challenges that we still face to unlocking the full potential of the atom to improve human lives and preserve our planet.

Speech Topic

Our Future: A world that unlocks the potential of the atom to improve human lives and preserve our planet

Nico Vollmer

ENS Board Member

Brief introduction

studied physics at Technische Universität München, and made his PhD at the research reactor FRM-2 about the high-density U-Mo Fuel.

He was a lecturer of neutron physics and Group leader in neutronics at Framatome – his other technical experience is deeply in materials for fuel. For Enhanced Accident Tolerant Fuel, Nico was the session head of the last European TopFuel. Today he is a board member of the ENS.

Presentation abstract

The keynotes from ENS will contain greetings from European Nuclear Society – a short wrap up of who we are, what we do in Europe and what will do concerning TopFuel, including latest technical trends. Most important: a big thank you to all who made this conference possible.

Lionel Gaiffe

Fuel Business Unit Senior Executive Vice President, Framatome

Brief introduction

LIONEL GAIFFE, SEVP Fuel BU

• 25 years' experience in the nuclear industry (fuel cycle and MOX fuel)

• Former head of Operations of the AREVA Fuel Manufacturing activities

Lionel Gaiffe was born in 1968. A French national, he is a graduate of the Ecole Nationale Supérieure des Arts & Métiers.

Lionel Gaiffe began his career in France in 1991 with the ASSYSTEM group. In 1993 he joined the MELOX plant as head of new projects, testing and commissioning. He moved to Cogema in 1996 as MOX US project manager before joining the AREVA group in 2002 as head of innovation policy. He is a board member of different research consortia and start-up funds. In 2004 he joined the AREVA NC site in La Hague, where he was first Deputy Maintenance Director, then for five years Industrial Director of the La Hague site, which includes two plants, 10 industrial sectors and 20 nuclear installations. Lionel Gaiffe is also a member of the La Hague Management Committee, and since 2011 he has headed the Technical Department, which he created. In October 2014 he took over responsibility for the AREVA NP fuel production plants and also became a member of the Executive Committee of the Mines-Front-end Business Group. On 1 July 2016, Lionel Gaiffe was named Director of the AREVA NP Fuel Business Unit and appointed to the AREVA NP Executive Committee.

Presentation abstract

Nuclear power can play a key role in the transition to a clean energy future. The need to reduce harmful emissions, whilst providing more energy to more people, positions the nuclear industry at the heart of sustainable development. With many new projects planned and in construction in China and in Europe, the future of nuclear industry is bright again.

As an international leader in nuclear energy with more than 60 years of expertise in the field,

Framatome is fully committed to meeting these new challenges with innovative solutions to support its customers producing ever cleaner, safer, and more economical low-carbon energy.

We give an overarching priority to safety, focus on the quality of execution and the performance in delivery, and we have a very robust supply chain.

To support this bright future for the industry, we are strengthening our R&D and innovation programs. We are also engaged in multiple initiatives with partners, regulators, and government agencies worldwide.

Many countries, China and France included, recently announced energy strategies that include substantial roles for nuclear power as well as considerable financial incentives to invest in it. Our time is now!

Speech Topic Framatome's ambition in supporting its customers and preparing for a low-carbon future.

PLENARY SESSION

July 18	**Technical Plenary Session** **Room 2-6** **Chair:** Yongjun JIAO, WRFPM 2023 Technical Program Chair		
	14:00-14:10	Yongjun JIAO	Chief expert and designer of nuclear fuel, China National Nuclear Corporation
	14:10-14:40	Jinzhao ZHANG	Technical Director/Global Expert - Business Area Global Nuclear, Tractebel Engineering S.A.
	14:40-15:10	James Stubbins	Professor, University of Illinois at Urbana-Champaign
	15:10-15:30	**Break**	
	15:30-16:00	Fei GAO	Professor, University of Michigan
	16:00-16:30	Per Magnusson	Project Manager, Studsvik
	16:30-17:00	**Discussion**	

Yongjun JIAO

Chief expert and designer of nuclear fuel, China National Nuclear Corporation

Brief introduction

Mr. Yongjun JIAO is a highly accomplished nuclear fuel expert with almost thirty years of experience in the nuclear field. He graduated from Harbin Engineering University (Harbin Shipping Building Engineering Institute) in 1993 and has been dedicated to nuclear engineering ever since.

He is the chief expert in nuclear fuel field at CNNC, a senior engineer at the researcher level, and a doctoral supervisor. He has presided over more than 10 national/provincial projects and has been recognized with numerous awards for his contributions to science and technology, including a first prize and a second prize of National Defense Science and Technology Progress.

He has successfully developed China's first large commercial pressurized water reactor fuel assembly with fully independent intellectual property rights and has focused on nuclear fuel design and research for over twenty years. Internationally, Mr. Yongjun JIAO is an active participant in international projects and events. He is an active member of the International Atomic Energy Agency (IAEA) Technical Working Group on Fuel Performance and Technology (TWG-FPT), as well as the SCIP program. He has participated in multiple international cooperative projects and has made significant contributions to the development of nuclear fuel on a global scale.

Jinzhao ZHANG

Technical Director,Tractebel (ENGIE)

Brief introduction

Dr ZHANG Jinzhao is a Technical Director and Global Expert, Business Area Global Nuclear, at Tractebel (ENGIE). He is in charge of nuclear fuel design, safety analysis and licensing. He has obtained his Master Degree in Nuclear Engineering from Xi'an Jiaotong University in 1987 and Ph. D. Degree in Mechanical Engineering from UC Louvain in 1993. He has 40 years' experience of R&D, engineering and consulting in nuclear reactor thermal hydraulics, fuel thermal mechanics, Multiphysics modelling, uncertainty and sensitivity analysis, safety analysis and licensing. He is an active member of the OECD/NEA Working Group on Fuel Safety (WGFS) and Expert Group on Reactor Fuel Performance (EGRFP); the IAEA Technical Working Group on Fuel Performance and Technology (TWGFPT) and the Pressurized Water Reactors Owners Group (PWROG) Analysis Sub-Committee (ASC). He has contributed to writing or updating safety guides, technical guidance and technical reports for the IAEA and the NEA in his domain of expertise. Currently, Dr Zhang is Chair of the Management Board of the NEA Rod Bundle Heat Transfer (RBHT) Project, the task leader of the NEA WGAMA/WGFS activity to write a Status Report on Good Practices for Analyses of Design Extension Condition without Significant Fuel Degradation (DEC-A) for Operating Nuclear Power Plants. He is also the co-chair of the IAEA Coordinated Research Project (CRP) on Testing and Simulation for Advanced Technology and Accident Tolerant Fuels (ATF-TS).

Speech Topic **Best estimate plus uncertainty fuel modelling and safety analysis to quantify margins**

James Stubbins

Professor in Nuclear Materials,University of Illinois Urbana-Champaign

Brief introduction

Donald Biggar Willett Professor of Engineering, Department of Nuclear, Plasma and Radiological Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois, 61801 USA

Prof. Stubbins leads research on advanced energy systems and materials development for current and advanced nuclear systems. These research interests include materials performance in intense, extreme environments including combinations of irradiation damage, corrosion, intermediate and high service temperatures and extended service lives. He has held research positions at the Karlsruhe Institute of Technology, the University of Oxford, Harwell Labs, and General Electric before joining the University of Illinois. During his tenure at Illinois, he held research positions at Argonne National Lab, Los Alamos National Lab, Oak Ridge National Lab, Risø National Lab, and the University of Pisa. He also holds a Visiting Professor position at Kyushu University through the Japan WPI International Institute for Carbon Neutral Research. He is a Fellow of the American Nuclear Society and holds several international awards including the ANS Mishima Award for “outstanding contributions of an individual in research and development work on nuclear fuel and materials

Speech Topic **Advanced 3D imaging of structure and mechanical deformation in irradiated materials for nuclear cladding and structural component applications**

Fei GAO

Professor in Materials Science, Nuclear Materials & Computer simulation
University of Michigan

Brief introduction

Fei Gao is a tenured professor in both the Department of Nuclear Engineering and Radiological Sciences and the Department of Materials Science and Engineering at the University of Michigan (MSU's Department of Nuclear Engineering has been ranked first in the U.S. in nuclear engineering for more than a decade). He was a Principal Scientist at Pacific Northwest National Laboratory and a Distinguished Professor at Washington State University.

His main research interests include: materials behavior and microstructure evolution in nuclear fusion reactors; materials behavior in nuclear fission reactors and fundamental theoretical studies to improve the lifetime of existing nuclear reactors; development of computer simulation methods for nuclear detector materials; electron, ion and solid interactions; and multi-scale computer simulation methods for materials. Professor Gao has published more than 350 research papers in this field, and his publications include the following journals： Nature Communication, PRL, PNAS, Nano Letter, ACS Nano, PRB, APL, Angewandte Chemie, Advanced Materials, Energy & Environmental Science, etc。

His papers have been cited more than 18,000 times (H-factor of 64). Prof. Gao has chaired many international symposia in the field of irradiation damage, and has been invited to give more than 200 lectures at various international academic conferences and prestigious research institutions and universities around the world, and has received many awards such as the U.S. Department of Energy Award for Outstanding Scientific Research in Basic Energy. His work in nuclear materials and related fields has been widely recognized by top experts in the field both internationally and nationally.

Speech Topic

Recent Progress of irradiated SiC or SiC/SiC Composites: Bridge Continuum with Atomic-level Simulation

Per Magnusson

Senior Project Manager,Studsvik

Brief introduction

Per Magnusson has 15 years of experience from nuclear safety research and international project management in the nuclear industry. His educational background is a PhD in materials science from École Polytechnique Fédérale de Lausanne , on the topic on creep of irradiated materials. His current work topics include fuel qualification and LOCA and RIA research.

Areas of expertise

- Nuclear safety research
- International-Joint Projects
- LOCA, RIA and other transient and off-normal fuel behavior
- Fuel and cladding qualification

Development of advanced fuel and cladding test techniques

Speech Topic **The Studsvik Cladding Integrity Program(SCIP)- An OECD-NEA International joint-project**

WRFPM2023

JULY 19

TECHNICAL SESSIONS

TECHNICAL SESSION

WEDNESDAY,JULY19,2023

Track1 -Advances in water reactor fuel technology and testing

Chair: Xiaomin WANG, NPIC

Secretary: Ziyi LI, NPIC

Speech	Time	Paper Title	Name	Position
Invited Speech	9:00am-9:20am	Innovative Fuel for NPP Operation Enhancement	ILYA USHMAROV	Head of Innovative Fuel Development Project, Tvel

Session 1-1, 9:20am-10:40am, Room 2-7

Moderator: Zhenbing CAI

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0148	Fretting wear behavior of pre-oxidation Zircaloy cladding in high-temperature pressurized water	Zhenbing CAI	Southwest Jiaotong University	Zhenbing CAI、Jun WANG、Ke LI 、Zhengyang LI 、Yongjun JIAO
WRFPM2023-0139	Composition Design and Corrosion Estimation of Zr Cladding in Simulated SMR Everioment	Qingdong LIU	Shanghai Jiaotong University	Qingdong LIU、Yixiao YU、Qifeng ZENG、Jianchao PENG、Lefu ZHANG、Libing ZHU、Yi ZHAO、Ruiqian ZHANG
WRFPM2023-0085	ADDITIVE MANUFAC-TURING PROCESS DESIGN FOR THIMBLE PLUG ASSEMBLY	Guopeng QIN	CNNC Jianzhong Nuclear Fuel Co., Ltd.	Guopeng QIN、Yushan HUANG、Xin TONG、Liying ZHANG、Kuzin Vadim
WRFPM2023-0038	PWR FUEL CYCLE: IN-CREASED ENRICHMENT, COMBINATION OF BURN-ABLE ABSORBERS	Kuzin Vadim	TVEL	Guopeng QIN、Yushan HUANG、Xin TONG、Liying ZHANG

Session 1-2，11:00am-11:40am，2:00pm-2:40pm ，Room 2-7

Moderator: Xiaomin WANG

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0118	Fretting Wear Property of Candidate ATF Materials	Qiang ZHANG	China Nuclear Power Technology Research Institute	Qiang ZHANG、Sigong LI、Yuan DING、Liting ZHU
WRFPM2023-0092	EXPERIMENTAL STUDY ON HEAT TRANSFER PERFORMANCE OF SIC CLADDING SURFACE UNDER SATURATED POOL BOILING AT ATMOSPHERIC PRESSURE	Qinglong WEN	Chongqing University	Zhenxun PENG、Desheng JIN、Yalun YAN
LUNCH				
WRFPM2023-0149	Research Status on UZr Metallic Fuel's Application in Power Reactors	Weiqian ZHUO	Nuclear Power Institute of China	Weiqian ZHUO、Gang LI、Yi ZHAO、Shaoyu QIU、Yongduo SUN、Zhihai LIAO、Yong ZHAO
WRFPM2023-0122	Hermeticity evaluation of neutron-irradiated SiC composite tubes for LWR cladding application	Xunxiang HU	Sichuan University	Xunxiang HU、Takaaki Koyanagi、Christian M. Petrie、Yutai Katoh

Session 1-3，2:40pm-3:40pm，Room 2-7

Moderator: Yuemin ZHOU

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0066	The irradiation hardening behaviors of Mo-Re alloys after Fe-ion irradiation	Xi QIU	Nuclear Power Institute of China	Xi QIU、Wenjie LI、Yong XIN、Yuanming LI、Dan SUN、Chenyang LU、Yongjun JIAO
WRFPM2023-0062	REACTOR CORES FOR SMALL-SIZED NUCLEAR POWER PLANTS (SNPP) AND FLOATING POWER UNITS (FPU)	Tuturkin Mikhail	Afrikantov OKBM JSC	Tuturkin Mikhail
WRFPM2023-0045	RECENT PROGRESS OF ZR-BASED MATERIALS RESEARCH ACTIVITIES FOR NUCLEAR FUEL CYCLE AT NPU	Weijia GONG	Northwestern Polytechnical University	Weijia GONG、Johannes Bertsch、Guanghai BAI、Xianzong WANG、Zhongkui LI、Jinshan LI

WRFPM2023

JULY 20

TECHNICAL SESSIONS

Track2 - Operation and experience

Chair: Guoliang ZHANG,CGN

Secretary: Qingyang LV, CGN

Session 2-1，9:00am-11:00am，Room 2-7

Moderator: Nico Vollmer

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0088	APPLICATION OF WANO FRI IN CGN OPERATING PWR UNITS	Pengtao FU	China Nuclear Power Technology Research Institute Co., Ltd	Pengtao FU、Zhijun LU
WRFPM2023-0051	AFA 3G Operating Experience	Gwen Bolsée	Framatome	Jinzhao Zhang, Nicolas Waeckel, Ki Seob Sim
WRFPM2023-0055	UPDATES TO THE IAEA GUIDE ON FUEL RELIABILITY AND PERFORMANCE	Jinzhao ZHANG	Tractebel (ENGIE)	Jinzhao ZHANG、Nicolas Waeckel, Ki Seob Sim
WRFPM2023-0035	CHARACTERISTICS OF TVS-K STRUCTURAL MATERIALS AFTER OPERATION IN THE PWR REACTOR AT RINGHALS-3 NPP	A.Y. SHEVYAKOV	JSC “VNIINM”	A.Y. SHEVYAKOV, V.A. MARKELOV, V.I. KUZNETSOV, V.V. NOVIKOV, K. LAFCHIEV, D. JÄDERNÄS, P. UGRYUMOV, A.A. SHISHKIN, A.F. RADOSTIN, D.N. KUZNETSOV
WRFPM2023-0096	Research and application of radioactive control methods on the primary circuit of PWR fuel cladding with loss of air-tightness	Xianggui ZHANG	Jiangsu Nuclear Power Corporation,	Xianggui ZHANG、Hongye YANG、Fei MA、Wenqi WU

Track3 - Transient and off-normal fuel behavior and safety related issues

Chair: Libing ZHU, SNERDI

Secretary: Biao HU, SNERDI

Session 3-1，9:00am-10:00am，Room 2-8

Moderator: Sichao TAN

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0132	PRELIMINARY DEVELOPMENT OF A SIMULATION CAPABILITY FOR ZIRCALOY CLAD BALLOONING IN LOCA	Wei LI	Xi'an Jiaotong University	Wei LI、Xiaoli WU
WRFPM2023-0016	OPTICAL AND INFRARED MEASUREMENT OF IZOTHERMAL BURST PRESSURE OF E110G	Nagy Richárd Antal	Centre for Energy Research, Budapest, Hungary	Márton Király Richárd Nagy Zoltán Hózer Péter Szabó
WRFPM2023-0002	INNOVATIVE HIGH TEMPERATURE BALLOONING AND BURST TESTS OF CLADDING MATERIALS	Király Márton	Centre for Energy Research, Budapest, Hungary	Márton Király, Richárd Nagy, Tamás Szepesi, Zoltán Hózer, Péter Szabó, Martin Ševeček, Abdollah Riahi, Amir Zareidoost

Session 3-2，10:20am-11:40pm，Room 2-8

Moderator: Libing ZHU

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0041	PARAMETRIC STUDY OF PHENOMENA INFLUENCING SECONDARY HYDRIDING DURING LOCA TRANSIENTS	KPEMOU Apou Martial	IRSN	A. M. KPEMOU, J. DESQUINES, T. TAURINES, S. GUILBERT, M.C. BAIETTO, B. NORMAND, J. SOULACROIX, A. AMBARD, F. BOURLIER
WRFPM2023-0047	BEHAVIOUR OF CR-COATED E110OPT ALLOY CLADDINGS UNDER OXIDATION CONDITIONS IN WATER AND STEAM AT TEMPERATURES UP TO 1500°C	Malgin Andrey	SC “VNIINM”, Moscow, Russia	Malgin Andrey
WRFPM2023-0068	Sensitivity analyses of Thermal Hydraulic parameters in ATWS by Rods Failure-loss of offsite power of the Third Generation Nuclear Power Plant	Mengying LIU	China Nuclear Power Technology Research Insititue Co.,Ltd	Mengying LIU、 Haode XU、 Qingyu XIE、 Peng CHEN
WRFPM2023-0043	Phase-field modelling of void evolution in binary alloys under irradiation	Yong Lu	Xiamen University	Yong Lu Xiaoyi Huang Zheng Jiang Dan Sun Xingjun Liu Cuiping Wang

Session 3-3，2:00pm-3:00pm，Room 2-8

Moderator: Yuanming LI

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0039	RE-EVALUATION OF FRAPTRAN'S CLADDING FAILURE CRITERION IN LOCA WITHIN R2CA H2020 PROJECT	Dif Brahim	VTT Technical Research Centre of Finland,	Asko Arkoma, Janne Heikinheimo
WRFPM2023-0112	ANALYSIS OF PELLET-CLADDING MECHANICAL INTERACTION AND FAILURE BEHAVIOR OF COMPOSITE SIC CLADDING DURING NORMAL AND RIA CONDITIONS	Ruixiao ZHANG	Xi'an Jiaotong University	Ruixiao ZHANG、Zhiwei LU、Yanan HE、Yingwei WU、Wenxi TIAN、G.H. SU、Suizheng QIU
WRFPM2023-0004	Analysis of microstructure in chromium coated zirconium cladding during high temperature oxidation	JUNG TAE SIK	Institute for Nuclear Research Pit	Diana Diniasi , Florentina Golgovici , Alexandru Anghel, Manuela Fulger , Carmen Cristina Surdu-Bob and Ioana Demetrescu

Track4 - Fuel cycle, used fuel storage and transportation

Chair: Joakim Lundström, Studsvik

Secretary: Xiaoluo WANG, NPIC

Speech	Time	Paper Title	Name	Position
Invited Speech	3:20pm-3:40pm	Introduction of nuclear fuel's industrial characteristic	Lei SHI	China Institute of Nuclear Industry Strategy

Track4 , 3:20pm-5:40pm, Room 2-8

Moderator: Joakim Lundstrom

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0040	RADIAL HYDRIDE PRECIPITATION IN FUEL CLADDING DURING BACK-END COOLING TRANSIENT UNDER DECREASING PRESSURE	Desquines Jean	IRSN	Jean Desquines Christine Sartoris Marine GuémasAlain Gérard
WRFPM2023-0027	TOWARDS A STATISTICAL METHODOLOGY FOR THE ASSESSMENT OF SPENT FUEL INTEGRITY IN TRANSPORT ACCIDENT SCENARIOS	Aguado Carlos	CIEMAT, Unit of Nuclear Safety Research,	Carlos Aguado, carlos.aguado@ciemat.es; Francisco Feria
WRFPM2023-0018	Cooperation between CNPRI and Framatome for Fuel Assembly characterization in Yangjiang nuclear plant in China	Laurence Bourachot	Framatome	Laurence Bourachot、Pengliang LIU
WRFPM2023-0081	STUDY ON THE APPLICATION OF INTELLIGENT STORAGE OF FUEL ASSEMBLY BASED ON RFID TECHNOLOGY	Shuang GUO	CNNC Jianzhong Nuclear Fuel Co., Ltd.	Kai CHEN、Xiaoyu GUO
WRFPM2023-0076	DIGITAL TRANSFORMATION OF FUEL PELLET PRODUCTION FACILITIES	Xiaoyu GUO	CNNC Jianzhong Nuclear Fuel Co., Ltd.	Kai CHEN、Shuang GUO、Yun TAN
WRFPM2023-0044	NEUTRON IMAGING OF HYDROGEN IN NUCLEAR FUEL CLADDINGS	Johannes Bertsch	Paul Scherrer Institut (PSI)	L. Duarte1, W. Gong, P. Trtik, O. Yetik, A. Colldeweih, C. Schneider, R. Zubler, J. Li, J. Bertsch

THURSDAY,JULY 20, 2023

Track2 - Operation and experience

Chair: Guoliang ZHANG,CGN

Secretary: Qingyang LV, CGN

Session 2-2, 9:00am-10:40am, Room 2-7

Moderator: Guoliang ZHANG

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0032	CURRENT EDF DEVELOPMENTS IN THE AREA OF FUEL INSPECTION AND REPAIR TOOLS	Christopher Reece	EDF	Christopher Reece, Matthieu Chavand
WRFPM2023-0094	RESERCH ON THE END OF LIFE(EOL) EXTENDED OPERATION SCHEME OF THE PWR UNITS OF QINSHAN NUCLEAR POWER	Xingjin SHI	Qinshan Nuclear Power Cooperation	Xingjin SHI
WRFPM2023-0032	CURRENT EDF DEVELOPMENTS IN THE AREA OF FUEL INSPECTION AND REPAIR TOOLS	Christopher Reece	EDF	Christopher Reece, Matthieu Chavand
WRFPM2023-0072	How to deal with the threat of new energy to the safe operation of nuclear fuel	Shaosheng GUO	China National Nuclear Corporatio	Shaosheng GUO、Qi ZHANG
WRFPM2023-0034	CONFIRMATION OF THE DESIGN CHARACTERISTICS OF THE TVS-K DESIGN AFTER OPERATION IN THE PWR REACTOR AT RINGHALS-3 NPP	A.F. Radostin	TVEL	A. Radostin, K.Lafchiev, D. Jädernäs
WRFPM2023-0019	A survey of worldwide fuel cycle design approaches and their implications on plant operations and safety analyses	John H. Strumpell	Framatome	J. Strumpell, R. Kliewer, J. O'Brian, N. Garner, B. Holden and L. Gerken, Framatome Inc N. Vollmer, M. Zilly, Framatome GmbH S. Zheng, Framatome SaS

Track 5 - Innovative fuel and related issues

Chair : Hua DENG, CJNF

Secretary: Xiaoyu GUO, CJNF

Session 5-1，Applications of new technology，11:20am-12:20am，Room 2-7

Moderator: LU Chenyang

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0052	Advancing SiC Ceramic Matrix Composite Cladding Development through Advanced Characterization	Xu PENG	Idaho National Laboratory	Peng XU、Fei XU、Zilong HUA、Alex Winston、Sean Gonderman、Jack Gazza
WRFPM2023-0057	Artificial Intelligence and Machine Learning applied to nuclear activities	Moraleda Pepa	ENUSA INDUSTRIAS AVANZADAS S.A.	David Verdejo Alejandro Carrasco Alicia Ariza Daniel Ramos Doroteo Toledano Pablo Ramírez Joaquín González
WRFPM2023-0028	PROtect: The Framatome E-ATF solution – Overview of recent achievements and next steps	Vioujard Nicolas	Framatome	Vioujard Nicolas

Session 5-2, Innovations in nuclear fuel, 2:00pm-3:20pm, Room 2-7

Moderator: Cristina MUNOZ-REJA RUIZ

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0037	NUMERICAL CALCULATION ON THERMAL EXPANSION OF UO2 – 3 VOL% Mo MICROPLATE PELLET	Lee Heung Soo	Korea atomic energy research institute	H.S. Lee, D.S. KimKim, J.H. Yang, J.H. Yoon, H.K. Kim
WRFPM2023-0135	FABRICATION AND IRRADIATION OF ANNULAR UO2 PELLETS	Yang Jae Ho	Korea Atomic E nergy Research Institute	Dong-Joo Kim, Heung Soo Lee, Hyung-Kyu Kim, DongSeok Kim
WRFPM2023-0110	Accident-Tolerant Fuel R&D Program in Japan	Osaka Masahiko	Japan Atomic Energy Agency	S. Yamashita, A. Mohamad, I. Ioka, Y. Nemoto, T. Kawanishi, Y. Kaji, M. Osaka, N. Murakami, M. Owaki, M. Sasaki, K. Sakamoto, J. Matsunaga, A. Yamaji, H. Ohta
WRFPM2023-0095	Study on Microstructure and Thermal, Mechanical Performance of TRISO Microspheres	Zongbei HE	Nuclear Power Institute of China	Zongbei HE、Jiangshan CHEN、Qiang ZENG、Xiaoqiang PAN、Lifu YAO、Shaoyu QIU

Session 5-3，Trends in relaed issues，3:40pm-5:20pm，Room 2-7

Moderator: Ping CHEN

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0078	THERMAL PROPERTIES MEASUREMENT OF TRISO PARTICLE COATINGS USING LASER-BASED THERMOREFLECTANCE TECHNIQUES	Yuzhou WANG	Sun Yat-sen University	Yuzhou WANG、 Xianfeng Ma
WRFPM2023-0058	VVER NUCLEAR FUEL DEVELOPMENT STRATEGY	Malchevskiy Dmitry	TVEL	A. Ugryumov, A. Shishkin, D. Malchevskiy
WRFPM2023-0033	COMPETENCE HUB: NUCLEAR SAFETY TRAINING	Wiesel Hendrik	Framatome	Dr. H. Wiesel, Dr. N. Vollmer
WRFPM2023-0031	FUEL TRAINING by Framatome	Nico Vollmer	Framatome	Nico Vollmer, James Brock
WRFPM2023-0007	Friction Corrections to Improve Accuracy of Cladding Strength Measurments from the Ring Tension Test	Robert Hansen	Idaho National Laboratory	Robert S. Hansen, David W. Kamerman, Fabiola Cappia

Track 6 - Fuel modelling, analysis and methodology

Chair: Jinzhao ZHANG, Tractebel

Secretary: Xiaoluo WANG, NPIC

Session 6-1, Fuel Rod Thermal Mechanics I, 9:00am-10:40am, Room 2-8

Moderators: Jinzhao Zhang (Tractebel, Belgium), Wenjie Li (NPIC, China)

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0005	THN's LATTICE-ASSISTED THERMAL CONDUCTIVITY REVISITED	Szpunar Barbara	University of Saskatchewan	Barbara Szpunar, Jerzy A. Szpunar
WRFPM2023-0067	Thermal Conductivity Test Study of Pellet to Cladding Interaction in NPP Design	Yan PENG	China Institute of Atomic Energy	Yan PENG
WRFPM2023-0070	ANALYSIS AND ASSESSMENT OF BEO-DOPED FUEL WITH FUEL ROD PERFORMANCE CODE JASMINE	kaiyuan WANG	China Nuclear Power Technology Research Institute Co. Ltd,	Kaiyuan WANG、Yanan ZHU、Xin JIN
WRFPM2023-0089	Modelling of the Gadolinium Fuel Tests with the JASMINE Fuel Performance Code	Xiaoyan WEI	China Nuclear Power Technology Research Institute	Yanan ZHU、Shengzhi YANG、Duoting XU、Xin JIN
WRFPM2023-0083	the role of dopant on the defect behavior in doped UO2 : a comparative ab initio study	Yong XIN	Nuclear Power Institute of China	Dan SUN, Huifang YUE、Yong XIN、Zhipeng SUN、Xi QIU、Mingyang ZHOU、Yuanming LI

Session 6-2，Fuel Rod Thermal Mechanics II，11:00am-12:20am，Room 2-8

Moderators: Wenjie Li (NPIC, China), Pau Aragon (CIEMAT, Spain)

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0003	PROGRESS ON MODELLING THE THERMO-MECHANICAL PERFORMANCE OF ACCIDENT-TOLERANT FUELS	Aragón Pau	CIEMAT, Unit of Nuclear Safety Research	P. Aragón, F. Feria and L.E. Herranz
WRFPM2023-0116	On the creep collapse of the cladding considering the irradiation growth effect	Ming ZHANG	China Nuclear Power Technology Research Institute Co.,Ltd.	Ming ZHANG、Yayun LUO、Yong LU、Yanan ZHU、Xiaohan LIU、Jinggang LI、Xinying MIAO
WRFPM2023-0113	LWR FISSION GAS BEHAVIOR MODELING USING OPENFOAM BASED FUEL PERFORMANCE SOLVER OFFBEAT	Tian ZHANG	Harbin Engineering University	J. Xie, N. He, Q. Wang and T. Zhang
WRFPM2023-0130	Development of Fuel Performance Analysis Code for Liquid Metal Cooled Fast Reactor Based on MOOSE Platform	Shihao SHAO	Xi'an Jiaotong University	Shihao SHAO、 Zhouyu LIU、Xiaobei XU、Yufan ZONG 、Liangzhi CAO、Hongchun WU

Session 6-3, Multi-physics, 2:00pm-3:20pm, Room 2-8

Moderators: Jinzhao Zhang (Tractebel, Belgium), Olivier Marchand (IRSN, France)

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0134	MODELING AND ANALYZING OF FUEL WITH MISSING PELLET SURFACE(MPS) DEFECT BASED ON MULTIPHYSICS METHOD.	Rong LIU	South China University of Technology	Rong LIU, Xiaoyang YUAN、Shengyu LIU
WRFPM2023-0023	Progress in the modelling of high burn-up structure: application of the TRANSURANUS//MFPR-F coupling to the NRC-192 Studsvik LOCA test	Slavickas Andrius	IRSN	Francois Kremer, Andrius Tidikas,Andrius Slavickas
WRFPM2023-0100	NUMERICAL INVESTIGATION ON THE EFFECT OF FUEL PULVERS ON AXIAL FUEL RELOCATION	Zehua MA	China Nuclear Power Technology Research Institute Co., Ltd.,	Weiwei WANG、 Liang REN、Zhikang LIN、Yong OUYANG、Xianghui LU
WRFPM2023-0107	IMPACT OF UNIAXIAL STRAIN ON OXYGEN DIFFUSION IN URANIUM DIOXIDE: A MOLECULAR DYNAMICS STUDY	Qingyu WANG	Harbin Engineering University	Yupeng CHEN、Qingyu WANG、Tian ZHANG

Session 6-4，Fuel Assembly Thermal Hydraulics, Mechanics and Neutronics，3:40pm-5:20pm，Room 2-8
Moderators:Yingwei WU(XJU, China), Ki Seob SIM (IAEA)

Paper No.	Paper Title	Corresponding author		All Authors
WRFPM2023-0145	THERMAL-HYDRAULIC CHARACTERISTICS OF TVS-K FUEL ASSEMBLY	Lukyanov Vladimir	Afrikantov OKBM JSC	Lukyanov Vladimir
WRFPM2023-0097	STUDY ON THERMAL HYDRAULIC CHARACTERISTICS OF ROD-TYPE FUEL IRRADIATION TEST SECTION	Liangqian FU	Nuclear Power Institute of China	Yuanyue ZHANG、Wenhua YANG、Liangqian FU、Wenbin ZHAO、 Liang ZHANG, Shuai JIN
WRFPM2023-0093	PRELIMINARY STUDY ON THE TORQUE COEFFICIENT AND FILTERING COEFFICIENT FOR THREADED FASTENERS IN FUEL ASSEMBLY	Hai WU	China Nuclear Power Technology Research & Institute	Hai WU、Yan GUO、Yuxiang ZHANG、Guoliang ZHANG
WRFPM2023-0022	Evaluation of SCALE code cross-section processing options for RBMK simulations	Slavickas Andrius	Lithuanian Energy Institute	Andrius Slavickas, Andrius Tidikas,Tadas Kaliatka
WRFPM2023-0036	ANALYSIS OF A CLADDING CRACK EMANATING FROM THE EDGE OF A CRACKED PELLET IN PCMI	KIM HYUNG KYU	Korea Atomic Energy Research Institute	Hyung-Kyu KimRobert J.H. Paynter Xiaojun HE

JULY 21

TECHNICAL TOUR, CULTURAL TOUR

TECHNICAL TOUR

You are required to sign up for the technical tour at the time of on-site registration on July 17, 2023 at the conference venue.

Seats are limited. First come, first served.

The comprehensive test facility for fast reactor steam generator, PUSA, built by Xi 'an Jiaotong University, is the first and only large-scale test facility capable of comprehensive performance assessment and validation of sodium-cooled fast reactor steam generators in China. It adopts electric heating to simulate nuclear reactor heat source, with a total power of 30 MW and international leading technical parameters. The facility fills the gap in the comprehensive test platform of autonomous large-scale sodium-related devices of SFRs in China, successfully verifies that the performance of the demonstration fast reactor steam generator meets the design and operation requirements, and provides a significant reference for China's first fully self-developed sodium-water steam generator to complete the manufacturing and application in the demonstration fast reactor on schedule. It is of great significance for the further development of advanced nuclear power in China.

Nuclear Thermal-hydraulic Laboratory (NuTHeL) of Xi'an Jiaotong University has independently designed and built a full range of testing and validation devices of large advanced pressurized water reactors for the integration effect of complex systems, the separation effect of core equipment, and the phenomenon effect of unit components. It includes the mechanism test platform of passive residual heat removal system, the ADS-4 injection pressure relief system platform of large advanced pressurized water reactor, the foreign material filtration characteristics test platform of the lower core header, the system platform of ECC safety injection characteristic, the validation device of the corium pool in the lower head of pressure vessel, the validation device of Voltage regulator water seal, the test platform of CCFL characteristic in the pressurizer surge-line, the test platform of flow heat transfer in steam generator tube bundles, the validation platform of containment dome condensation, the validation platform of containment ventilation condensation, the validation platform of containment spray phenomenon, the test platform on CHF of single rod at high temperature and high pressure and the test platform of flow heat transfer characteristics of helical tube, etc.

NuTHeL has built a comprehensive test base for severe accidents of nuclear reactors, as well as sodium-cooled fast reactors, lead-bismuth reactors, molten salt reactors, marine small reactors and other advanced nuclear power system thermal safety validation platforms, to meet the urgent need for thermal fluid design and safety analysis and validation of advanced nuclear power systems. It includes the six-degree-of-freedom platform of symmetrical double-loop natural circulation system under high-temperature and high-pressure condition, the test platform of thermal and hydraulic characteristics of spiral-cross fuel in fluorine-salt-cooled high-temperature reactors, the large-scale comprehensive test platform of lead-bismuth flow heat transfer, the test platform for deformation characteristics of full-scale fast reactor assembly outer casing, the mechanism test platform on flow heat transfer and flow solidification of lead-bismuth coolant, the thermal hydraulic test platform of lead-based generator tube rupture accident, the test platform of fuel melting and molten relocation in lead-based reactor under severe accident, the test platform of interaction between molten and coolant in lead-based reactor core etc.

CULTURAL TOUR

Charming Xi'an One day of

Terra Cotta Warriors + Huaqing Palace + Camel Bell Legend Show + Tang Dynasty Sleepless City

Schedule

In the morning, the hotel will pick up the guests, take a bus to Lintong (about an hour's drive), visit the royal garden [Huaqing Pool] where Emperor Xuanzong of Tang of the Tang Dynasty and Yang Guifei wrote a beautiful love story (about 2 hours' visit), five halls, Jiulong Lake, visit the Eighth Wonder of the World [Terra Cotta Warriors Museum] after lunch (about 2 hours' visit), and be honored as the "Eighth Wonder of the World". 1、 Pit 2 and 3; Watch the large-scale performance [Camel Bell Legend Show] (about 70 minutes). Visit Asia's largest waterscape Musical fountain Square [Giant Wild Goose Pagoda North Square]. Look far at the landmark building of Xi'an [Giant Wild Goose Pagoda]. Visit the online red card place [Datang Sleepless City] and then stay in the hotel for a rest






Price

service standard	★ Dining: Including 1 buffet, the meal standard is 50 yuan/person ★ Ticket: the first big ticket for the scenic spot: (wireless Bluetooth headset for Huaqing Pool of Terra Cotta Warriors) ★ Vehicle use: local tourist air-conditioned vehicle ★ Tour Guide: Local excellent tour guides provide full servicew ithout entering the store throughout the entire process ★ Insurance: Travel agency liability insurance+travel accident insurance ★ Each person will receive a complimentary bottle of water every day
contact information	Guo Meng 15002917693 Email: Szlgm150@126.com

SPONSORS AND EXHIBITORS

Chinese Nuclear Society

The Chinese Nuclear Society (hereafter referred to as “CNS”) was established in 1980. It is a non-for-profit organization dedicated to nuclear science, technology and industry. Its object is to mobilize the nuclear professionals to promote the advancement and peaceful use of nuclear science and technology. The three main missions of the CNS are to conduct the academic exchange, popularize the knowledge of nuclear science and technology to the public, strengthen the communication among Chinese and overseas colleagues.

CNS has more than 19,000 individual members, more than 200 organization members and 9 working committees, covering 48 technical divisions and connecting 23 provincial nuclear societies.

CNS plays a positive role in advancing the development of the industry of nuclear science and technology. We spare no efforts to unify and mobilize the vast number of nuclear science and technology professionals’ home and abroad, to build “the Family of Nuclear Science and Technology Professionals”, to make our voice heard and promote the peaceful use of nuclear energy.

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