



# **Regional Workshop on Advances in the Modelling and Simulation of Thermal Hydraulics in Liquid Metal Cooled Fast Reactors**

**Hosted by the**

Government of India

**through the**

Global Centre for Nuclear Energy Partnership

**Bahadurgarh, India**

**6–10 April 2020**

**Ref. No.: EVT1904440**

## **Information Sheet**

### **Introduction**

The nuclear industry has from its inception recognized the important role of fast reactors and related fuel cycles in ensuring the long-term sustainability of nuclear power. Many of the International Atomic Energy Agency's (IAEA's) Member States are actively developing reactor, coolant, fuel and fuel cycle technologies related to fast reactors. In addition to current fast reactor construction projects, several countries are engaged in intense research and development programmes for the development of innovative, or Generation IV, fast reactor concepts. Reactor technologies under development include sodium, lead, gas, molten salt and even supercritical water cooled systems and technologies and

accelerator-driven systems. In parallel, several demonstration projects, ranging from small to large scale, are under study or construction.

Liquid metal cooled fast reactors (LMFRs) are one of the main technologies being pursued for development and deployment. The most mature fast reactor technology, the sodium cooled fast reactor, has more than 400 reactor-years of experience acquired through the design, construction, operation and decommissioning of experimental, prototype, demonstration and commercial units operating in a number of countries. Lead and lead-bismuth cooled fast reactors are also under development at the national and international levels.

The modelling and simulation of thermal hydraulics play a crucial role not only in understanding the physical phenomena of reactors, but also for their safe operation. This workshop aims to provide information on and explain recent developments in the modelling and simulation of thermal hydraulics in LMFRs.

## **Objectives**

The objective of the event is to review designs of liquid metal cooled fast reactors and the related scientific and technological aspects, in particular advanced physical and mathematical models for numerical simulation of reactor thermal hydraulics. It will also offer a forum for active discussions and for sharing new ideas among the participants and lecturers.

## **Target Audience**

The workshop is intended for individuals from Member States who are working in, or considering working in, the field of fast reactors or a related area.

## **Working Language(s)**

English.

## **Structure**

The event will consist of plenary sessions and group discussions to share and discuss experiences, challenges and recent developments in modelling and simulation of thermal hydraulics of LMFRs.

The event will start at **09:30 on Monday, 6 April 2020**, and will be concluded by **12:00 on Friday, 10 April 2020**.

# Topics

It is envisaged that the following topics will be addressed and discussed during the workshop:

- Thermal hydraulics of advanced LMFRs;
- Overview of design and operation of fast reactors worldwide;
- Development of fast reactor technology in India;
- Thermal hydraulic feedback experience from FBTR operation;
- Commissioning experience with respect to thermal hydraulics of PFBR;
- Regulators' view on fast reactor thermal hydraulics with respect to safety;
- Consideration of pool hydraulic aspects in fast reactor design;
- Challenges in natural convection-based decay heat removal;
- Hydraulic experiments in support of LMFR technology;
- Engineering qualification through sodium experiments: scaling and instrumentation challenges;
- Coolant–structure interaction issues in fast reactor systems;
- Experimental investigations of thermal hydraulics related to core disruptive accidents (CDAs);
- Experimental studies of LMFR thermal hydraulic and empirical correlations for friction factors and heat transfer coefficients;
- Subchannel analysis of LMFR fuel assemblies;
- System thermal hydraulics of LMFRs;
- CFD modelling of LMFRs;
- Advanced investigations in the area of gas entrainment;
- Experimental and theoretical investigation of magnetohydrodynamics of electromagnetic pumps;
- Sodium boiling: experimental studies and modelling approach;
- Containment thermal hydraulics with respect to post-CDA phenomenon;
- Fuel–coolant interaction; and
- Debris bed cooling and core catcher performance during post-accident heat removal.

## Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State, participants are requested to send the **Participation Form (Form A)** to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) for onward transmission to the IAEA by **2 March 2020**. Participants who are members of an organization invited to attend are requested to send the **Participation Form (Form A)** through their organization to the IAEA by the above deadline.

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and financial matters.

Please note that the IAEA is in a transition phase to manage the entire registration process for all regular programme events electronically through the new InTouch+ (<https://intouchplus.iaea.org>) facility, which is the improved and expanded successor to the InTouch platform that has been used in recent years for the IAEA's technical cooperation events. Through InTouch+, prospective participants will be able to apply for events and submit all required documents online. National authorities will be able to use InTouch+ to review and approve these applications. Interested parties that would like to use this new facility should write to: [InTouchPlus.Contact-Point@iaea.org](mailto:InTouchPlus.Contact-Point@iaea.org).

## Expenditures and Grants

No registration fee is charged to participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to the event.

The application for financial support should be made using the **Grant Application Form (Form C)** which has to be stamped, signed and submitted by the competent national authority to the IAEA together with the **Participation Form (Form A)** by **2 March 2019**.

## Venue

The event will be held at the Global Centre for Nuclear Energy Partnership (GCNEP) in Bahadurgarh, India. Participants must make their own travel and accommodation arrangements.

## Visas

Participants who require a visa to enter India should submit the necessary application as soon as possible to the nearest diplomatic or consular representative of India.

## IAEA Contacts

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Subsequent correspondence on scientific matters should be sent to the Scientific Secretary and correspondence on other matters related to the event to the Administrative Secretary.