



International Atomic Energy Agency (IAEA)

**Physics Section, Division of Physical and Chemical Sciences
and
Nuclear Power Technology Development Section, Division of Nuclear Power
Development**

Technical Meeting (TM-41429) on *Fast reactor physics and technology*

hosted by

Indira Gandhi Centre for Atomic Research

14 – 18 November 2011

Kalpakkam, India

[Online Pre-registration](http://meeting.iaea.org/default.aspx?meetingid=41429)

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BACKGROUND

Renewed interest in nuclear energy is driven by the need to develop carbon free energy sources, demographics and development in emerging economies, and security of supply concerns, is likely to accelerate fast reactor R&D activities and deployment of new prototypes. Today, several IAEA Member States are active in the area of fast reactor technology development, and it appears realistic to assume that deployment of advanced prototype fast power reactors will materialize within the time frame of the next 10 - 20 years. It is expected that an initial phase of demonstration will be followed by a transition phase to commercial fast reactors, and eventually to a further innovation step opening up the full potential of the fast neutron system and closed fuel cycle technologies. Future deployment of such innovative systems will enhance sustainability and reduce radioactive wastes of the nuclear fuel cycle, further enhance reactor safety, improve economics for electricity production and new applications such as the supply of process heat and/or hydrogen production, and increase proliferation resistance.

Over the last 40 years, the IAEA has been meeting the needs of interested Member States for information exchange and collaborative platform in the area of fast reactor technology. Within the framework of the Technical Working Group on Fast Reactors (TWG-FR) based on IAEA's mechanisms, i.e. International Conferences, Coordinated Research Projects, Technical and Expert meetings.

The incorporation of inherent and passive safety design features can reduce design complexity, as well as the needs for human intervention resulting in fewer potentially unsafe actions. However, taking into consideration recent advances in design of innovative fast reactor technology with passive safety features, improved fuel cycle and high performance, further sharing of experiences and information on reactor design and its critical components, as well as various technical parameters, boundary conditions, and data related to reactor core and structural materials is needed. Specifically, recent advances in research and technology development in the area of reactor core characteristics, fuel design, and performance of sodium, lead, and gas cooled fast reactor designs will be discussed during the Technical Meeting. In particular emphasis will be placed on design aspects of advanced prototype fast reactors, in which much of the scaling up required for a commercial station in terms of both overall size and individual components, as well as the testing of innovative features needs to be done.

The operating regimes for structural components materials in these innovative reactor concepts extend to higher temperatures and doses than the experience in existing power reactors. In order to achieve these objectives, a concentrated effort is still needed to develop and qualify new materials for key structural components. At present, extensive characterization and testing of recently developed candidate materials using the most advanced techniques of as-fabricated materials are needed as a necessary precursor to the subsequent understanding of the radiation degradation, ageing and phase stability mechanisms. In addition, improved design methodologies to ensure the safe application of these advanced materials in high temperature reactor environments is needed. This will also require development of advanced monitoring and inspection provisions of inner and outer surface of the primary vessel and internal structures and other primary components.

OBJECTIVES

The overall objective of the Technical Meeting, “Fast reactor physics and technology” is to present the state-of-the-art as far as innovation for reactor designs, in particular critical components is concerned. Specific objectives of the meeting are as follows:

- Summarise recent advances in the development of reactor designs for minor actinides utilisation with emphasis on sodium and lead-cooled concepts;
- Discuss the impact of novel core structural materials for reactor internals and fuel assemblies from the neutronics and thermal-hydraulics view points (reactivity, coolant circulation, heat capacity, etc.);
- Assess the innovative aspects of small and medium size sodium and heavy liquid metal cooled fast reactors, in particular long-life designs (no on-site refuelling), inherent safety characteristics, and “mobile fuels”;
- R&D activities related to sodium, heavy-liquid metal and gas cooled reactor concepts in terms of experiments, methods development as well as validation and qualification.

Following the experts’ presentations, working groups will discuss the priorities in the areas of (1) transmutation of long lived actinides, (2) reassessment of core component materials (emphasis on metallic fuel), (3) long-life core designs; and (4) methods development experiments, as well as validation procedures.

EXPECTED OUTCOME OF MEETING

The outcome of the meeting will be a meeting report summarizing the participants’ activities and recommendations. The report will reflect the importance and relevance of fast reactor technology in current nuclear power program as well as recent R&D activities related to the specific objectives. In

addition, the full proceeding will eventually be published electronically or as a peer-reviewed journal. The final decision will be taken after review of the quality and scientific impact of the individual papers.

MEETING FORMAT

The format of the meeting will be invited and contributed oral presentations presented during sessions devoted to special topics, with subsequent discussions. There will be some restriction on the duration of presentations. An electronic projector with a computer capable of reading CDs and memory sticks will be available (Power Point or Acrobat recommended). The official language of the meeting is English. No interpretation will be provided. It is expected that the meeting will start at 09:00 on 14 November 2011 and will be concluded by 15:00 on 18 November 2011.

PARTICIPATION

In order to participate in the meeting, the following important steps must be completed:

1) *Pre-registration*

Online pre-registration is open to all who are interested in participating; however, in addition to the on-line pre-registration, all further steps specified below must be completed in order for final registration and eventual participation to be accepted. For online pre-registration please follow the link Online Pre-registration (<http://meeting.iaea.org/default.aspx?meetingid=41429>).

2) *Abstract Submission*

Persons wishing to make a presentation must submit an abstract of maximum one page in total length, in electronic format directly to A.Zeman@iaea.org and pcp@igar.gov.in. The abstract must be text only and must contain the author's name, affiliation and e-mail address. Acceptable file formats are Microsoft Word, HTML, or plain text. The one page abstract must be received by **2 September 2011**. The abstracts will be evaluated by the Scientific Committee, and authors will be informed of the acceptance of their contributions by e-mail, by **16 September 2011**. The program agenda and a book of abstracts will be prepared and e-mailed to all participants as PDF file attachments.

Important: Contributors of material to be included in the IAEA's proceedings are required to assign all copyrights or rights to publish to the IAEA.

The authors should make sure that the files do not include copyrighted fonts or other impediments for reproduction.

The abstract shall be prepared according to the following instructions:

- 1) Page size: A4 (21 cm by 29.7 mm) – vertical orientation
- 2) Margins 25mm all around
- 3) Layout:
 - Title: single-spaced, 14-point size, Times New Roman Font (TNR), bold
 - Authors: single-spaced, 12-point size, TNR Font
 - Affiliation: single-spaced, 12-point size, TNR Font, italic
 - Text: 1.5 spaced, 12-point size, TNR Font
 - Length: one page

Important: In case of sending Microsoft Word files, authors should use True Type Embedded Fonts (when saving the file, click Tools, then Options, and tick Embed True Type fonts. This will help to prevent change of fonts when the file is read in a different system, as it will be in most of the cases).

3) IAEA participation

A request for participation will only be accepted if the **Participation Form A** is transmitted through the appropriate Governmental representative authority i.e. (Ministry of Foreign Affairs, National Atomic Energy Authority of the applicable country), and the nomination is received at the IAEA by **2 September 2011**.

IAEA Member States or invited international organizations are eligible to attend and registration should be by persons actively involved in the subject matter of the meeting. All persons wishing to participate in the work of this meeting are requested to complete the Participation Form and send it as soon as possible to the IAEA and ensure that it is simultaneously submitted to the relevant Government authority for official nomination. Participants whose designations have been received by the IAEA will receive further details approximately 6 weeks before the meeting.

PRESENTATIONS

The presentations should be sent either as a Microsoft Word file, Power Point file, or Adobe PDF format file, complete with all text, figures and tables. All presentations will be converted as received, to an Adobe PDF file and placed on a CD-ROM for distribution to all participants at the meeting.

PAPERS

A manuscript will be prepared for inclusion in the meeting proceedings compiled by the IAEA in CD-ROM format (it will be available on the web and will include the presentations of authors submitting a manuscript). For detailed instructions regarding how to prepare the manuscript please check the link Author Instructions. Authors must submit a signed **Paper Submission Form B** to the IAEA for copyright purposes. Electronic version of papers will be collected during the meeting.

EXPENDITURES AND FINANCIAL SUPPORT

Costs for the organization of the meeting are borne by the IAEA. No registration fee is charged to participants. As a general rule, the IAEA does not pay for the travel and living expenses of participants'. However, limited financial support is available to assist the attendance of selected experts with active presentation, principally those from developing Member States. Usually only one grant for financial support is awarded per Member State. If participants or governments wish to apply for a grant on behalf of one of their experts, they should ensure that applications for grants are:

- Received by the IAEA Scientific Secretaries by **2 September 2011**,
- Accompanied by a duly completed and signed **Grant Application Form C**,
- The would-be participant has a contribution (paper) approved by the committee.

Applications that do not comply with these requirements will not be considered. The grants awarded will be in the form of lump sums usually covering only part of the cost of attendance. The grants are as a rule, transferred to the individual accounts at least one month before the meeting date. Grants for financial support will be announced around **16 September 2011**.

VISA

Designated participants who require a visa to enter India should submit the necessary application to the nearest diplomatic or consular representative of India as soon as possible. The official letter of invitation from the IAEA usually serves to assist with visa arrangements. General assistance inquiries in this regard can be addressed to Ms Judy Glueck, J.Glueck@iaea.org.

ACCOMMODATION

It is the responsibility of the participants to arrange their accommodation. Detailed information on transport arrangements to/from Indira Gandhi Centre for Atomic Research and other items will be sent to all designated participants approximately 5 weeks before the meeting.

DEADLINES

- 2 September 2011:** Submittal of abstracts according to the instructions above closes,
2 September 2011: Submittal of requests to the IAEA for financial support according to the instructions above closes,
16 September 2011: Participants informed of the acceptance of their contributions,
16 September 2011: Participants informed of the acceptance of their request for financial support,
14 November 2011: Meeting begins.

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