Nuclear Energy Agency

NEA/NSC/DOC(2019)10

For Official Use **English text only**

24 May 2019

NUCLEAR ENERGY AGENCY
NUCLEAR SCIENCE COMMITTEE

OECD/NEA Second Multi-Physics Model Validation Workshop (MPMV-2)

ANNOUNCEMENT & PROPOSED AGENDA

Garching, Germany
June 26-28, 2019

Dr. Shuichi Tsuda
shuichi.tsuda@oecd-nea.org
Tel. : +33 (0) 1 45 24 10 83

JT03447976

OECD Nuclear Energy Agency
Nuclear Science Committee

OECD/NEA Second Multi-Physics Model Validation Workshop (MPMV-2)

Hosted by Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH
Garching, Germany

June 26-28, 2019

ANNOUNCEMENT & PROPOSED PROGRAMME

Sponsorship

The second Multi-Physics Model Validation Workshop (MPMV-2) is conducted under Task Force 2 of the Expert Group on Multi-Physics Experimental data, Benchmarks and Validation (EGMPEBV) at NEA/OECD. MPMV-2 is a follow up of the first Multi-Physics Model Validation Workshop (MPMV-1), which was organized and hosted by the Department of Nuclear Engineering of North Carolina State University (NCSU) on June 27 – 29, 2017 at NCSU, with support from the Idaho National Laboratory through its National University Consortium program and Nuclear Energy Knowledge and Validation Center program. It was under the auspices of the EGMPEBV, Nuclear Science Committee (NSC) at NEA/OECD. The workshop was attended in total of 63 participants from industry, regulatory agencies, national and naval laboratories, research institutions, consulting companies, and academia from different countries. There were 6 focused sessions with 36 presentations, and 6 panel discussions and 9 posters in a poster session reflected the work performed within: different DOE programs (CASL, NEAMS, TREAT and LWRS), NRC and IRSN; OECD/NEA expert groups; national laboratories; industry; academia, and other organizations. MPMV-1 materials can be found at:

https://www.ne.ncsu.edu/outreach-engagement/workshops/multi-physics-model-validation-workshop/

Under the guidance of the Nuclear Science Committee (NSC), the EGMPEBV was created in 2014 to deal with the activities associated with the certification of experimental data and benchmark models along with establishing the processes and procedures for using the data and benchmark models for validation of multi-physics modelling and simulation tools and data.

The organization of the EGMPEBV relies on three Task Forces, respectively focused on 1) Experimental Data Qualification and Benchmark Evaluation; 2) Validation Methods and Standards, and Needs, and 3) Specific Applications.

Task Force 1 (TF1) is focused on providing better and more accurate experimental datasets, which support validation of high-fidelity multi-physics modelling and simulation (M&S) tools. At the same time, it has to consider the incompleteness of past experimental data sets

(in terms of data, documentation, and/or uncertainties) and the limited number of currently available multi-physics experimental facilities.

Task Force 2 (TF2) is designed to identify validation needs, develop validation methods and guidelines, also covering uncertainty qualification for the new family of multi-physics, multi-scale codes in the context of emerging demands such as longer fuel cycles and power uprate. Organizing multi-physics model validation workshop every two years is part of Sub-task 6 of TF2 activities.

Task Force 3 (TF3) is focused on applications of validation experiments and has the objective to organize multi-physics modelling and simulation (M&S) benchmarks involving validation experiments. TF3 is focused on developing example applications of validation experiments for novel experimental multi-physics benchmarks. It comprises three sub-tasks based on three different sources of experimental data.

This workshop (MPMV-2) will be held in conjunction with other meetings/workshops under the auspices of the NSC, NEA/OECD in order to facilitate co-ordination and sharing of work. Three other meetings are being held in Garching, Germany during the same week in order to combine efforts in common areas such as modelling and simulation; verification, validation and uncertainty analysis; and applications and to make the participation more efficient. The meetings/workshops concerned are:

- *June 24 – June 25, 2019* – OECD/NEA Rostov Unit 2 (Rostov2) VVER-1000 Multi-Physics Benchmark – First Benchmark Workshop (Rostov2 -1).
- *June 24 – June 25, 2019* – First Workshop on Preservation of Thermal-Hydraulics (TH) experimental data (TH-1). This workshop is organized under auspices of the new Expert Group on Core Thermal-Hydraulics (EGCTH) with WPRS at NSC, NEA/OECD.
- *June 26 – June 27, 2019* – AER group D meeting (AER-D).

The weeklong events are sponsored by GRS. Kiril Velkov from GRS is the local event host.

Background and Purpose of the MPMV-2 Workshop

The workshop objective is to bring together researchers from academia, industry, research institutions and government to discuss emerging needs, technical challenges and opportunities for R&D and collaboration on validation and uncertainty quantification of multi-physics models in nuclear reactor and nuclear energy applications. The targeted audience are professionals from industry, regulation, national laboratories and government agencies as well as graduate students, post-doctoral scholars and faculty from universities. This workshop will provide participants with understanding and knowledge of state-of-the-art concepts, principles, procedures, and challenges for validation of traditional and novel multi-physics modelling and simulation tools.

Scope and Technical Content of the Benchmark Workshop

The technical topics to be addressed at the workshop include:

a) Validation of improved applications of traditional multi-physics tools;

b) Data support in advanced modelling and simulation: status and perspectives;

c) Approaches and best practices in single physics and multi-physics model validation;

d) State of practice in Verification & Validation (V&V) and Uncertainty Quantification (UQ) of traditional multi-physics codes;

e) Challenges in V&V and UQ of novel (state-of-the art) multi-physics codes;

f) Validation data needs and multi-physics validation hierarchy;

g) Optimal use and preservation of legacy experimental data;

h) Deigning validation experiments in the new facilities;

i) V&V and UQ of Hi2Lo model information methodologies;

j) Utilizing data science and analytics and artificial intelligence in model validation;

k) Multi-physics model validation benchmarks;

l) Development of multi-physics model validation protocol and guidelines;

m) International and national collaborative activities in model validation.

Organization of the Benchmark Workshop

The meeting is organised around the discussion in depth of different aspects of multi-physics model validation including approaches, best practices, needs, challenges, methods, tools, data support, trends, and issues, emerging requirements, applications, collaboration and opportunities. The workshop will consist of focused sessions of invited presentations, sessions of participants' presentations, and panel discussions.

Participation in the Benchmark Workshop

For this workshop sponsored by the NSC, participation is open to students, faculty, engineers, scientists, and experts from academia, research laboratories, safety authorities, regulatory agencies, utilities, owners' groups, vendors, etc. from OECD/NEA member countries.

Organisation and Programme Committee of the Benchmark Workshop

An Organisation and Programme Committee has been nominated to make the necessary arrangements for this second Workshop and to organize the Sessions, draw up the final programme, appoint Session Chairmen, etc. The members of the Programme Committee are:

Kiril Velkov – Chair and Local Host
GRS, Germany

Maria Avramova – Co-Chair
North Carolina State University (NCSU), USA

Upendra Rohatgt
Brookhaven National Laboratory (BNL), USA

Mark DeHart
Iadaho National laboratory (INL)

Jean-Pascal Hudelot
CEA, France

Hakim Ferroukhi
Vice-Chair of WPRS at NSC, OECD/NEA
PSI, Switzerland

Kostadin Ivanov
Chair of WPRS at NCS, OECD/NEA
NCSU, USA

Alessandro Petruzzi
N.IN.E. S.r.l., Italy

Evgeny Ivanov
IRSN, France

Taku Nagatake
JAEA, Japan

David Novog
McMaster University, Canada

Boris Shumskiy
National Research Centre Kurchatov Institute, Russia

Tim Valentine
Chair of EGMPEBV at NSC, OECD/NEA
Oak Ridge National Laboratory (ORNL)

Secretariat **Shuichi Tsuda**
OECD/Nuclear Energy Agency, France

Proposed Programme of the Benchmark Workshop

The proposed programme for the OECD/NEA MPMV-2 workshop was drawn-up by the Programme Committee and is enclosed as ***Appendix 1***.

Language of the Benchmark Workshop

The official language of the OECD/NEA MPMV-2 workshop is English.

Proceedings of the Workshop

A summary of the workshop will be published by the OECD/NEA after the meeting. The summary will be distributed free of charge to the participants in the Workshop and to Delegates of the NSC. The programme committee and the session Chairmen will prepare a summary report on the main results of the meeting for presentation to the NSC. Presentations will be available free of charge to the participants to download from participants' restricted area after the workshop.

Contacts and Registrations

A common registrations webpage is made available for the participants of the Rostov2-1, TH-1, MPMV-1 and AER-D workshops/meetings:

https://www.oecd-nea.org/science/egmpebv/workshops_grs_2019/

Inquiries about registrations can be directed to: Shuichi Tsuda, Shuichi.TSUDA@oecd-nea.org

Please send the titles and authors of your presentations for MPMV-2 workshop to Kiril Velkov:

Kiril.Velkov@grs.de

Workshops' Location

The meeting place for the four workshops/meetings during the week of June 24-28, 2019 is the GRS, Garching, Germany .

The information for transportation and hotels is provided also at the link given above. There is no registration fee for participating in the workshops. Coffee breaks, lunches and a banquet will be provided also free of charge.

Appendix 1

OECD/NEA Second Multi-Physics Model Validation Workshop (MPMV-2)

Host Organization
Hosted by Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH
Garching, Germany

June 26-28, 2019

PROPOSED PROGRAMME

M1-19: Session code

- M1. Introduction and opening remarks
- M2. Overview of lessons learned from the first Multi-Physics Model Validation Workshop (MPMV-1)
- M3. Experimental data qualification and benchmark evaluation
- M4. Improved applications of traditional multi-physics tools and their validation
- M5. Status and perspectives of novel (state-of-the-art) multi-physics tools
- M6. Data support in advanced modelling and simulation
- M7. Approaches and best practices in single physics and multi-physics model validation
- M8. State of practice in Verification & Validation (V&V) and Uncertainty Quantification (UQ) of traditional multi-physics codes
- M9. Challenges in V&V and UQ of novel (state-of-the art) multi-physics codes
- M10. Validation data needs and multi-physics validation hierarchy
- M11. Optimal use and preservation of legacy experimental data
- M12. Handbooks and databases for validation
- M13. Deigning validation experiments in the new facilities
- M14. V&V and UQ of Hi2Lo model information methodologies
- M15. Utilizing data science and analytics and artificial intelligence in model validation
- M16. Multi-physics model validation benchmarks
- M17. Development of multi-physics model validation protocol and guidelines
- M18. Optimization of input data processing form large multi-physics simulations
- M19. International and national collaborative activities in model validation.
- M20. Action items, next workshop, and plans
- M21. Conclusions and closing remarks