



Second Announcement and Call for Extended Abstracts
Abstract Deadline Extended: December 23, 2015

Scope

Following the five previous workshops in the CFD4NRS series, held in [Garching](#), Germany (Sept. 2006), [Grenoble](#), France (Sept. 2008), [Washington](#) D.C., USA (Sept. 2010), [Daejeon](#), S. Korea (2012) and Zurich, Switzerland (2014), it is intended to again offer a forum whereby numerical analysts and experimentalists can exchange information in the application of Computational Fluid Dynamics (CFD) and Computational Multi-Fluid Dynamics (CMFD) to Nuclear Power Plant (NPP) safety and future design issues. The workshop will embody both state-of-the-art (single-phase and multi-phase) CFD applications and new experimental data explicitly designed for CFD validation. Emphasis will be in the following areas:

- Single-phase and multi-phase CFD simulations with a focus on validation will be welcome in areas such as: single-phase and multi-phase heat transfer, free-surface flows, direct contact condensation, and turbulent mixing. These should relate to NPP-relevant safety issues, such as pressurized thermal shock, critical heat flux, pool heat exchangers, boron dilution, hydrogen distribution in containments, thermal striping and fatigue, and/or advanced design concepts, such as tight-lattice fuel configurations, passive safety options, design optimization, etc. The use of systematic error quantification and the application of Best Practice Guidelines (BPGs) will be severely scrutinized in the paper review process. Some discussion of Uncertainty Quantification (UQ) is also encouraged.
- Experiments providing data suitable for CFD or CMFD validation are strongly recommended. These should include local measurements, using, for example, multi-sensor probes, laser-based techniques (LDV, PIV or LIF), hot-film/wire anemometry, digital imaging, or other advanced measuring techniques. Papers should include explicit focus on initial and boundary conditions needed for subsequent CFD simulation, and a discussion of measurement uncertainties and error bounds. Papers not fulfilling these criteria are likely to be rejected.

Background

The last two decades have witnessed an increasing use of 3-D CFD and CMFD simulation techniques in nuclear reactor technology, in recognition of the fact that a number of important thermal-hydraulic phenomena cannot be predicted to the required accuracy and spatial resolution using traditional one-dimensional system analysis codes.

CFD codes contain empirical models for simulating turbulence, heat transfer, multi-phase interaction and chemical reactions. Such models must be thoroughly validated (against experimental data) before they can be used with confidence in nuclear reactor applications. The validation process can only be justified by comparing model predictions against trustworthy test data. However, reliable model assessment requires CFD simulations to be undertaken with full control over numerical errors and input uncertainties.

These requirements prompted a joint OECD/NEA–IAEA initiative to form Writing Groups of experts with the specific task of addressing the maturity of CFD codes for NPP applications, in particular to (i) set down [Best Practice Guidelines](#) (BPGs) for the use of CFD simulation techniques, (ii) to document the [validation database](#) on which the level of maturity of CFD codes may be judged, and (iii) to catalogue the extensions needed to current CFD codes to enable them to perform [trustworthy multi-phase simulations](#). The CFD4NRS series of workshops was created to advance the fulfilment of these issues and within the NEA structure [CFD is a very active field](#).

Keynote Speakers

Each technical session at CFD4NRS-6 will be preceded by a keynote lecture, given by an internationally recognised expert. In addition, an integral part of the workshop will be to report results of the OECD-PSI International Benchmark on *Flow mixing with uncertainty quantification*, which is based on an experiment recently carried out in the GEMIX facility at the Paul Scherrer Institute, Switzerland. The first invited lecture will provide a synthesis of results from this exercise.

Poster Sessions

- At the discretion of the reviewers, provision will be made for some papers to be presented as posters rather than orally. Full papers will still be expected; these will then be included in the official proceedings. This procedure will be followed to ensure that high quality papers, though ones not reflecting the major themes of the Workshop, are properly acknowledged.
- A dedicated poster session will also be arranged for participants in the OECD-PSI Benchmark to display their results. To avoid duplicity, a written paper will not be required in this case.

Use of CFD in Reactor Design

Following a recent IAEA initiative, it is apparent that the use of CFD in nuclear reactor design studies warrants increased exposure within the CFD community. Consequently, as in the previous workshop, it is hoped to include a limited number of papers on the use of CFD in guiding nuclear reactor design thinking.

Organizing Committee

Emilio Baglietto, Massachusetts Institute of Technology, USA, General Chair

Dominique Bestion, Commissariat à l’Energie Atomique, France, Co-Chair

Ghani Zigh, United States Nuclear Regulatory Commission, USA, Co-Chair

Dave Pointer, Oak Ridge National Laboratory, USA

Arnoldo Badillo, Paul Scherrer Institute, Switzerland

Martin Kissane, Secretariat, OECD Nuclear Energy Agency, France

Mark Harper, Observer, International Atomic Energy Agency, Austria

Scientific Committee

Henryk Anglart, KTH, Sweden
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Emilio Baglietto, MIT, USA
Dominique Bestion, CEA, France
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Yassin Hassan, Texas A&M, USA
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Seiichi Koshizuka, University of Tokyo, Japan
Eckart Laurien, Stuttgart, Germany
Dirk Lucas, HZDR, Germany
Elia Merzari, ANL, USA
Fabio Moretti, UniPisa, Italy
Horst-Michael Prasser, ETHZ, Switzerland
Hideo Nakamura, JAEA, Japan
Afaque Shams, NRG, Netherlands
Jan-Patrice Simoneau, EDF, France
Brian L. Smith, PSI, Switzerland
Chul-Hwa Song, KAERI, Korea
Ghani Zigh, US NRC, USA

Local Organizing Committee

Jacopo Buongiorno, MIT, USA
Matteo Bucci, MIT, USA
Carolyn Z. Carrington, MIT, USA

Dates & Deadlines

December 23, 2015	Abstract Deadline Extended
November 25, 2015	Extended abstracts due
January 18, 2016	Invitation to write a full paper
March 21, 2016	Receipt of draft of full paper
May 09, 2016	Decision on acceptance; reviewers' comments
June 06, 2016	Final paper due
July 04, 2016	Deadline for early registration

Instructions to Authors

Authors are invited to submit **extended abstracts** (500-600 words, no figures) on or before **December 23, 2015** via email to the OECD Secretariat (Martin.KISSANE@oecd.org), with a copy to the General Chair (emiliob@mit.edu). The preferred format is MS Word, following the guidelines below:

TITLE OF PAPER (Centred, Times New Roman, Caps, 11pt, Bold)

(single line space)

Author-1, Author-2, (Centred, Times New Roman, 11pt, Bold)

(single line space)

Affiliation (Centred, Times New Roman, 11pt, Italics)

(single line space)

(single line space)

Extended Abstract (Left Justified, Times New Roman, 11pt, Bold)

(single line space)

Text of extended abstract (Usual A4 Margins, Left and Right Justified, Times New Roman, 11pt). The abstract should contain a clear description of the work to be presented, including background details, purpose, approach used, novelty, and a summary of new results obtained. The number of words should be in the range 500–600, and there should be no figures. Equations should only be included if absolutely necessary, and should be limited to no more than one or two; each equation should be written on a separate line.

Recommendations

Papers that present new experimental data and novel measurement techniques should state what CFD model validation need is specifically being addressed by the technique, should quantify the domain of application, and include a measure of the experimental uncertainty.

Papers that present simulation of validation experiments using single-phase or multi-phase CFD tools should include comparison against experimental data, including uncertainties, and should discuss the adequacy of the measurements for the proper validation of CFD tools. Discussion of the general requirements of such “CFD-grade experiments” should also be made.

The papers that present CFD code applications should try to justify all the choices made in regard to the physical models, nodalisation, and numerical options. Authors are strongly encouraged to apply Best Practice Guidelines (BPGs) as far as possible.

As with previous workshops in the CFD4NRS series, acceptance or non-acceptance of papers will depend crucially on adherence to quality of content and potential for presentation within a common theme.
