

NRC INTERNATIONAL TRIP REPORT

Subject

Attendance of OECD/CSNI sponsored Special CFD Group.

Dates of Travel, Countries and Organizations Visited

I departed for Paris France on Sunday April 24, and returned to the U.S. on Friday April 29, 2011. In the first two days, April 26-27, the meetings were held in OECD Headquarters, Paris France. In the third day, April 28, the meeting was held at the NEA Headquarters, Issy-les-Moulineaux, France.

Author, Title, and Agency Affiliation

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Sensitivity

Not applicable

Background/Purpose:

In May 2002, an "Exploratory Meeting of Experts to Define an Action Plan on the Application of Computational Fluid Dynamics (CFD) Codes to Nuclear Reactor Safety Problems" was held at Aix-en-Provence, France. The outcome was a recommendation that three writing groups be created to provide recommendations on:

1. Writing Group 1 (WG1): Guidelines for Use of CFD in Nuclear reactor safety Application. The work was concluded in December 2006.
2. Writing Group 2 (WG2): Assessment of CFD Codes for Nuclear reactor safety Problems. The work was concluded in December 2007.
3. Writing Group 3 (WG3): Extension of CFD Codes to two-Phase Flow safety Problems. The work was concluded in December 2010.

The Writing group activities is now concluded. As follow-up activities, a special CFD group was created, consisting of the chairmen of WG1/WG2/WG3 to report back to CSNI Working Group on Analysis and management of Accidents (WGAMA). The main objective of this group was:

- Identify needs for future CFD work within WGAMA activities.
- Propose a work scope for WGAMA in the CFD area 2008 to 2011, and beyond if necessary.

Enclosure

Abstract: Summary of Pertinent Points/Issues

The proposal from the Special CFD group was to:

- Create, update and maintain a web-based centre of expertise on CFD for Nuclear Reactor Safety (NRS).
- Provide central organization for further workshops in CFD4NRS series, following those at GRS Garching, Germany in 2006, CEA Grenoble, France 2008, and USNRC Rockville, USA 2010.
- Acts as a central organizing body for NRS benchmarking activities.

Three main topics were discussed in these meetings:

- Current and future of CFD WIKI pages from WG1, WG2 and WG3.
- Planning for the next CFD Workshop CFD4NRS-4, to be hosted by The Korea Atomic Energy Research Institute (KAERI) in Daejeon, South Korea in September 2012.
- Discussion and finalization of the second OECD/CSNI/CFD WG validation exercise (flow through a grid spacer).

Discussion:

In the first day of the meeting, detailed description of the items entered in the WIKI CFD Web pages were discussed. The entire content of the final report issued by WG1 and WG2 are in the web. WG3 final report will follow by the end of 2011. Additional Information about the past (CFD4NRS-3) and future (CFD4NRS-4) workshops and the second CFD benchmark exercise will be posted on the CFD Web. Arrangements are made to receive suggestions and remarks on the contents of the web page. In this meeting progress of the second validation exercise (flow through a grid spacer) was discussed. Also, in this meeting, preparation for CFD4NRS-4 Workshop to be organized by South Korea in September 2012 was discussed.

In the second day of the meeting, the CSNI/CFD writing group members invited all CFD developers and users to discuss the CFD documents and web pages produced by the OECD/NEA CFD writing groups. The purpose of this meeting is to improve these living CFD documents and web pages as well as to propose new CFD V&V (verification & validation) tests and benchmarks.

In the third day of the meeting, the kick off meeting of the second validation exercise organized by the special CFD group was held. About 40 people, representing different laboratories and universities who will be participating in the validation exercise joined the kick-off meeting. The validation exercise is sponsored by KAERI and consists of modeling water flow through a grid spacer.

The spacer grids that support the fuel rods in a nuclear reactor core also act as turbulence-enhancing devices to improve the heat transfer from the hot surfaces of the

rods to the surrounding coolant stream. The design of the spacer grids is therefore an important optimization parameter for reactor vendors. Traditional approach to spacer design by experiments is now being supplemented by Computational Fluid Dynamics (CFD). This validation exercise will investigate the best modeling options to capture the essential features of the turbulent structures downstream of the spacer, and ultimately the heat transfer mechanism

The deadline to submit the results to this validation exercise is April 30, 2012. The participant will have the opportunity to present their calculation in the CFD4NRS-4 workshop in September 2012. The experimental data for this second benchmark test will be released and presented by KAERI who performed this experiment in the next CFD Special Writing Group that will be held in Paris in June 2012.

Pending Actions/Planned Next Steps for NRC

The Special CFD group will meet again in June 2012 to organize the forth CFD workshop (CFD4NRS-4). Additionally, the experimental results of the second validation exercise for flow through a grid spacer will be released. Also, the CFD Wiki pages as well as the CFD writing groups three documents will be discussed and improved.

Points for Commission Consideration or Items of Interest

No commission action is required.

Attachments

The agenda of the three meetings and the announcement for the second CSNI benchmark are attached.

“On the Margins”

None