

Unclassified

NEA/NSC/DOC(2008)8



Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

17-Jun-2008

English - Or. English

**NUCLEAR ENERGY AGENCY
NUCLEAR SCIENCE COMMITTEE**

**NEA/NSC/DOC(2008)8
Unclassified**

**OECD/NEA/NSC PBMR COUPLED NEUTRONICS/THERMAL
HYDRAULICS TRANSIENT BENCHMARK
THE PBMR-400 CORE DESIGN - 5th Workshop (PBMRT5)**

Proposed Programme

**14 September 2008
Interlaken, switzerland**

JT03247947

**Document complet disponible sur OLIS dans son format d'origine
Complete document available on OLIS in its original format**

English - Or. English

**OECD/NEA/NSC
PBMR COUPLED NEUTRONICS/THERMAL HYDRAULICS TRANSIENT BENCHMARK
THE PBMR-400 CORE DESIGN– 5th Workshop
(PBMRT5)**

Kongresszentrum
Interlaken, Switzerland
14 September 2008

Background and Purpose of the Benchmark Workshop

The Nuclear Energy Agency (NEA) of the Organisation for Economic Cooperation and Development (OECD) has accepted, through the Nuclear Science Committee (NSC), the inclusion in its programme of the Pebble-Bed Modular Reactor (PBMR) coupled neutronics/thermal hydraulics transient benchmark problem.

The PBMR is a High-Temperature Gas-cooled Reactor (HTGR) concept, which is being developed as a demonstration plant to be built in South Africa. The deterministic neutronics, thermal-hydraulics and transient analysis tools and methods available to design and analyse PBMRs have, in many cases, lagged behind the state-of-the-art compared to other reactor technologies. This has motivated both the testing of existing methods for HTGRs, and the development of more accurate and efficient tools to analyse the neutronics and thermal-hydraulic behaviour for the design and safety evaluations of the PBMR. Both tasks require the definition of appropriate benchmarks to verify and validate the existing and new methods in computer codes.

The first workshop for the Coupled Neutronics/Thermal Hydraulics Transient Benchmark - the PBMR-400 Core Design, was held on 16th and 17th June 2005 at the OECD Headquarters, Paris, France. The need for code-to-code validation in HTR methods and software was noted. The PBMR 400MW benchmark test cases were introduced in detail including the neutronic and thermal hydraulic design and data. The three steady-state cases and the six different transient cases, which are the main focus areas of the benchmark, were discussed. The details of the meeting are available in NEA/NSC/DOC(2005)13.

The second workshop took place on 26th and 27th January 2006 at the OECD/NEA Headquarters. The details of the meeting are available in NEA/NSC/DOC(2006)29. Presentation of the status of work related to the PBMR benchmark was presented by ten different participants. Improvements in the benchmark definition (clarifications and additions) were also discussed. The focus of the meeting was the steady-state results for Cases 1 (neutronics) and Case 2 (thermal hydraulics). Comparisons were made between the different participants' results and some discrepancies were identified. A special session was organised at the PHYSOR 2006 conference held in Vancouver, Canada, during September 2006. A total of five presentations were made focussed on the definition, methods applied and steady state results.

The third workshop was held on 1st and 2nd February 2007 at the OECD/NEA Headquarters. The details of the meeting is available in NEA/NSC/DOC(2007)11. At the meeting the final changes to the benchmark definition were approved for implementation and all outstanding issues and information were finalised in July 2007 and are available on the benchmark web site. Detailed discussions on the steady-state results took place. In order to enhance the quality of results a Questionnaire was compiled to be completed by all participants.

The fourth workshop was held from 21st to 25th January 2008 at the OECD/NEA Headquarters. During the first three days a workshop, training course with hand-on use of the steady-state and transient pebble-bed reactor thermal-hydraulics code DIREKT was held, followed with the PBMR-400 benchmark sessions. The details of the meeting are available in NEA/NSC/DOC(2008)7.

The fifth workshop is the last one in this series and will be held at the Kongresszentrum Interlaken, Switzerland in conjunction with the Physor'08 reactor physics conference, held on the same premises.

Scope and Technical Content of the Benchmark

The scope of the benchmark is to establish a well-defined problem based on a common given set of cross sections and to compare methods and tools in core simulation and thermal hydraulics analysis with a specific focus on transient events through a set of multi-dimensional computational test problems.

Scope and Technical Content of the 5th Workshop (PBMRT5)

The scope of the fourth workshop is as follows:

14 September 2008

A 1-day meeting will be held to discuss the OECD PBMR-400 Benchmark transient. The focus areas are as follows:

1. Steady State Results finalization
The final results sent for the steady-state cases will be represented and discussed.
2. Transient Results finalization
Exercises 1 to 6 results will be presented and discussed.
3. Benchmark draft report discussion
Get feedback and discuss draft benchmark report with focus on results discussions and conclusions

The proposed meeting programme is included in Annex I.

The workshop also has the following general aims and objectives:

- Further participants' knowledge and experience on HTR and specifically on pebble-bed reactors through discussions and peer reviews
- Identify opportunities to publish benchmark results in a journal.

Participation in the Benchmark Workshop

Participation in the Benchmark Workshop is sponsored by the Nuclear Science Committee (NSC), and is restricted, for efficiency, to experts (research laboratories, safety authorities, regulatory agencies, utilities, owners' groups, vendors, etc.) from OECD Member countries who have participated so far in these benchmark studies.

The meeting is also open to experts in this field attending the Physor'08 conference including experts from IAEA member countries who are in a position to provide a substantive contribution to this study. Participation of these experts will be arranged by the NEA Secretariat and includes participants involved in the Gen-IV International Forum VHTR studies.

Sponsorship

The fifth workshop for the Coupled Neutronics/Thermal Hydraulics Transient Benchmark - the PBMR-400 Core Design, will be held on 14th September 2008 at the Kongresszentrum, Interlaken, Switzerland, with the support of the Nuclear Science Committee (NSC) of the NEA of OECD and under the supervision of the Working Party on Scientific Issues in Reactor Systems (WPRS).

Organization and Programme Committee of the Benchmark Workshop

An Organization and Programme Committee proposed to make the necessary arrangements for the Fifth Benchmark Workshop and to organize the Sessions, draw up the final programme, appoint Session Chairmen, etc. Its proposed members are:

Frederik Reitsma

Chairman

Nuclear Engineering Analysis Group Leader
PBMR (Propriety) Limited
PO Box 9396
0046 CENTURION
South Africa
Tel: +27 (0)12 641-1433; Fax +27 (0)12 641-2703
E-mail: Frederik.Reitsma@pbmr.co.za

Thomas J Downar

Professor
Nuclear Engineering
Purdue University
W. Lafayette, Ind 47907-1290, USA
Tel: +1 (765) 494-5752; Fax: +1 (765) 494-9570
E-mail: downar@ecn.purdue.edu

Bismark Tyobeka

PhD
Nuclear Power Technology Development Section
Department of Nuclear Energy
International Atomic Energy Agency
Wagramer Str. 5, 1400 Vienna, Austria
Tel.: (43-1) 2600 22565; Fax: (43-1) 2600 29598
Email: b.m.tyobeka@iaea.org

Kostadin Ivanov

Professor
Nuclear Engineering Programme
The Pennsylvania State University
230 Reber Building
University Park PA 16802
USA
Tel: +1 (814) 865 0040; Fax: +1 (814) 865 8499
E-mail: kni1@psu.edu

Secretariat: **Enrico Sartori**
OECD / Nuclear Energy Agency
12 boulevard des Iles
92130 Issy-les-Moulineaux, France
Tel : +33 1 45 24 10 72; Fax : +33 (1) 4524 1110
E-mail: sartori@nea.fr

Language of the Benchmark Workshop

The official language of the Fourth Benchmark Workshop is English.

Proceedings of the Workshop

A summary of the Workshop will be published by the OECD after the meeting and distributed to the participants in the Workshop. The programme committee and the session chairmen will prepare a Summary Report on the main results of the meeting for presentation to the NSC. In addition, copies of presentations will be distributed free of charge to all participants at the meeting.

Workshop Location / Local Arrangements / Transportation

Casino Kursaal, **Room Harder 1**, Strandbadstrasse 44, CH-3800 Interlaken, Switzerland
Tel: +41 33 827 61 00, Fax: +41 33 827 61 05, <http://www.casino-kursaal.ch/>

Concerning transportation please access: http://www.physor2008.ch/confinfo_howto.shtml

Annex I

**OECD/NEA/NSC
PBMR COUPLED NEUTRONICS/THERMAL HYDRAULICS TRANSIENT BENCHMARK
THE PBMR-400 CORE DESIGN– 5th Workshop**

Casino Kursaal
Room Harder 1
Strandbadstrasse 44, CH-3800 Interlaken, Switzerland
14 September 2008

PROPOSED PROGRAMME

- I. General Session (Chair: F. Reitsma)
 - 1. 09:30 – 09:45 Introduction and opening remarks – introduction of participants
 - 2. 09:45 – 09:50 Adoption of agenda
 - 3. 09:50 – 10:30 Feedback on Benchmark Status, Activities and PBMRT4 meeting

- II. Feedback by all participants (Chair K. Ivanov)
 - 4. 10:30 – 11:30 Presentations from all participants on progress and results.
(short 5-10 minute status updates; maximum 5 slides)

- III. Benchmark Steady State Cases (Chair B. Tyobeka)
 - 5. 11:30 – 12:30 Steady State Test cases

12:30 – 13:30 Break

- IV. Transient Cases Comparisons (Chair A. Pautz)
 - 6. 13:30 – 15:30 Transient cases results and comparisons

- V. Discussion and closing (Chair E. Sartori)
 - 7. 15:30 – 16:00 Discussion on finalising the benchmark report, main conclusions, publications and the PBMR benchmark special session at Physor'08

NUCLEAR SCIENCE COMMITTEE

OECD/NEA/NSC
**PBMR COUPLED NEUTRONICS/THERMAL HYDRAULICS TRANSIENT BENCHMARK
 THE PBMR-400 CORE DESIGN–5th Workshop**

Casino Kursaal
Room Harder 1
 Strandbadstrasse 44, CH-3800 Interlaken, Switzerland
 14 September 2008

PARTICIPANT REGISTRATION FORM

To be sent as soon as possible, and by **21 August 2008**, at the latest to:

<p>Frederik Reitsma NEA group PBMR Pty Ltd PO Box 9396 0046 CENTURION South Africa Tel: +27 (0)12 641 1433 Fax +27 (0)12 641-2703 E-mail: Frederik.Reitsma@pbmr.co.za</p>	<p>Enrico Sartori OECD / Nuclear Energy Agency 12 Bd des Iles 92130 Issy les Moulineaux France Tel: +33 1 45 24 1072 or 78 Fax: +33 1 45 24 11 10 or 28 E-mail: sartori@nea.fr</p>
---	--

Name:

Organization:

Address:

E-mail:

FAX:

I shall attend the Coupled Neutronics/Thermal Hydraulics Transient Benchmark - The PBMR-400 Core Design Benchmark Workshop

If you are attending, will you be giving a short (5 – 10 minutes) presentation? _____

If yes, what is the title of this presentation and authors?

I will not attend but send me a summary _____

Additional Comments: