COE-INES Business Trip Report

PHYSOR-2006 TOPICAL MEETING 参加報告
出張期間：2006 年 9 月 9 日～9 月 16 日
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出張先：Hyatt regency Vancouver, Vancouver, British Columbia, カナダ

Report on PHYSOR-2006 TOPICAL MEETING

Conference Details

Paper Information

PaperID	： 152390
Paper Title	：Cell Configuration Effect on Feasibility of Water Cooled Thorium Breeder Reactor
Type of presentation	： POSTER SESSION + discussion
Type of paper	： Technical publication for paper proceeding

Name of Conference

PHYSOR-2006, American Nuclear Society's Topical Meeting on Reactor Physics
Theme: Advances in Nuclear Analysis and Simulation

Date and place

September 10-14, 2006, Vancouver, BC, Canada

Research Abstract

As a fuel candidate, thorium cycle shows some advantages such as good breeding capability, higher performance of burn-up and from proliferation point of view, thorium is more proliferation resistant. The shipping port reactor and molten salt breeder reactor showed that breeding is possible with thorium in a thermal spectrum. Breeding is made possible by the high value of neutron regeneration ratio η for ^{233}U in thermal energy region. In the present study, feasibility of water cooled thorium breeder reactor is investigated. A calculation method by coupling the equilibrium fuel cycle burn-up calculation and cell calculation of PIJ module of SRAC2002 code have been performed. The reactor is fueled by ^{233}U -Th Oxide and it has used the light water coolant and zircaloy-4 as moderator and cladding, respectively. The key properties such as flux, , enrichment, criticality and breeding performances are evaluated for different moderator to fuel ratios (MFR) and burn-ups. The different pin cell types have been investigated in order to analyze the effect of different fuel pin diameter. The results show the feasibility of breeding for different fuel pin cell types. The required ^{233}U enrichment is about 2% - 9% as initial fissile loading. The lower MFR and the higher enrichment of ^{233}U are preferable to improve the average burn-up; however the design feasible window is shrunk. The thicker pin cell shows wider feasible areas and requires lower enrichment than thinner pin cell. It means that thicker fuel pin diameter obtains better performances for breeding and reducing the fissile material utilization.

Program Details

Name of Program
PHYSOR-2006 TOPICAL MEETING
Advances in Nuclear Analysis and Simulation

Place of program
PHYSOR 2006 Topical Meeting
Venue: Hyatt regency Vancouver, Vancouver, British Columbia, CANADA.

Activities
The conference was held for 5 days with several additional programs such as workshop, tour of TRIUMF, and dinner at Vancouver aquarium. PHYSOR-2006 was representing 392 registrants from 25 countries and approximately 147 different institutions. It was truly an international event which about 58% of the attendees coming from outside the USA and Canada. The attendees included 54 students.

I. PHYSOR-2006 TOPICAL MEETING
Luncheon Talk
The PHYSOR-2006 luncheon talk on Monday September 11 will be given by Dwight A. Willett, Executive Vice President, Corporate Services of Bruce Power, which operates the Bruce Nuclear Power Plant in Tiverton, Ontario, Canada.

Plenary Sessions

- The Physics of GEN-III+ Reactors (4 papers; session A01)
- Advances in Analysis Methods and Reactor Simulation [presented by Jess Gehin, ORNL] (1 paper; session A02)
- Advances in Nuclear Data Libraries (4 papers; session B11)

II. Technical Session and Own Presentation

Technical Sessions

- 3-D Neutron Transport Methods (Robert Roy, Ecole Polytechnique; Elmer Lewis, Northwestern University; 7 papers; sessions B01, C20)

- Accelerators, Transmutation and Spallation (Yousry Gohar, ANL; Eric Pitcher, LANL; 9 papers; sessions B10, C07)
- Advanced Fuel Cycles for Fuel Management (Pavel Hejzlar, MIT; 12 papers; C09, C11)
- Advanced Reactor Designs (Temitope Taiwo, ANL ; 12 papers; sessions B12, C10)

- Advances in Reactor Assembly and Core Analysis Methods (Ren-Tai Chiang ; 18 papers; sessions A06, A12; B14; D06)

- Covariance Data Generation for Nuclear Applications (Luiz Leal, ORNL ; 9 papers; sessions C01, C06)
- Criticality Benchmarks and Experiments (Russ Mosteller, LANL; 9 papers; sessions A07, A13)
- Detector Technology (Mike Heibel, Westinghouse Nuclear Services ; 4 papers; session C16)

- Fuel/Core Design and Analysis (Dimitrios Cokinos, BNL; Kevin T. Clarno, Jess Gehin, ORNL ; 15 papers; sessions A04, A11, B16)

- Fusion Blanket Physics (Yonghee Kim, KAERI, South Korea ; 2 papers; session D10)
- HTR Numerical Benchmarks and Studies (Sedat Goluoglu, ORNL; Kevin Hesketh, Nexia Solutions, United Kingdom ; 9 papers; sessions B08, C02)
- In-core Fuel Management Optimization (Akio Yamamoto, Nagoya University, Japan ; 7 papers; session C15)
- International Collaboration in Reactor Physics (Ray Klann, ANL; Jean-Pascal Hudelot, CEA, France ; 6 papers; session D14)
- LFR (Lead Fast Reactor) Physics (Hamid Aït Abderrahim, SCK-CEN, Belgium ; 3 papers; session B06)
- Monte-Carlo Methods and Developments (John C. Wagner, ORNL; 9 papers; sessions B09, B15)
- Multi-physics Coupled Code Systems and Multi-scales Computation (Eric Royer, CEA, France ; 13 papers; sessions C05, D02)
- Multiprocessing Methods and Algorithms for Nuclear Applications (Yousry Azmy, Penn State University; 7 papers; sessions A05, A08)
- Neutron Physics (Bojan Petrovic, Westinghouse ; 4 papers; session A10)
- Nuclear Criticality Safety (Harold L. Dodds, Ron Pevey, University of Tennessee; 3 papers; session D08)
- Nuclear Data (Mike Dunn, ORNL ; 17 papers; sessions B04, B07, C03)
- Nuclear Engineering Distance Education (Harold L. Dodds, University of Tennessee; 5 papers)
- Nuclear Methods for Nonproliferation and Homeland Security (Sara A. Pozzi, ORNL; Yousry Azmy, Penn State University; 8 papers; sessions B05)
- Nuclear Safety (Werner Maschek , IKET -FZK, Germany; Martin Zimmermann, PSI, Switzerland ; 4 papers; session C18)
- Nuclear Safety Validation & Performance of ENDF/B-VII (Richard McKnight, ANL; 3 papers; session C19)
- Nuclear Standards (Dimitrios Cokinos, Brookhaven National Laboratory; 7 papers; session C12)
- OECD PBMR Benchmark (Enrico Sartori, OECD/NEA ; 5 papers; session D05)
- Physics and Modeling of Research Reactors (Jack Brenizer, Penn State University and Paul Wilson, University of Wisconsin; 17 papers; sessions A09, A14, B02)
- Reactor Analysis Methods (Won Sik Yang, ANL ; 25 papers; sessions C04, C08, C13, D01)
- Reactor Physics (Hassan Albasha, Bruce Power ; 13 papers; sessions D03, D12)

- Reactor Physics Experiments and Analysis (Rakesh Chawla, EPFL, Switzerland ; 10 papers; sessions B13, C17)

- Regulatory Perspective on Nuclear Analysis and Simulation (Parvaiz Akhtar, CNSC ; 4 papers; session C14)
- The International Reactor Physics Experiment Evaluation Project (IRPhEP) (J. Blair Briggs, INL ; 4 papers; session D11)
- Transport Methods (Mark D. DeHart, ORNL; 8 papers; sessions A03, A15)
- Uncertainty Analysis Methodologies and Applications in Reactor Safety (Rafael Macian, Audrius Jasiulevicius, PSI, Switzerland ; 6 papers; session B03)
- Very High Temperature Reactor (VHTR) Physics (Taek K. Kim, ANL ; 9 papers; sessions D04, D07)

Poster Session

My paper was presented on session C21 at Poster Session (Wednesday 2006 September 13, 17:15-19:15). There are 47 papers which was included in poster session. In that session, it was nice poster presentation, and I had discussed with other presenter and attendees who interest on my field. Some researchers gave suggestion and comments, besides asked the questions. The title of my poster presentation is Cell Configuration Effect on Feasibility of Water Cooled Thorium Breeder Reactor. The paper was presented and published in Proceeding of PHYSOR 2006 as technical publication.

Concluding Remark

The PHYSOR 2006 Topical Meeting of Advances in Nuclear Analysis and Simulation was held on September 10-14, 2006, in Vancouver, BC, Canada. All events of the conference were very successful and have a lot of mutual understanding between nuclear engineering expertise's, especially for young nuclear engineering generation. Thank you for COE-INES of Tokyo Institute of Technology which supported me for this interesting conference