



# THERMAL HYDRAULICS DIVISION NEWSLETTER

Spring 2016

## Message from the Chair



Dear THD Members,

2015-16 has perhaps been a challenging year to be a nuclear engineer, as even the exciting news of the recent completion of the Watts Bar 2 reactor comes packaged with announcements that other operating plants may

be closed prematurely. In spite of these setbacks, however, members of the thermal hydraulics community continue ensuring safe and efficient operation of the current fleet, educating and training young engineers and engineering students, and performing research and development work of the next generation of nuclear reactor technology.

The excellent work in thermal hydraulics research has been on display in an unusually busy year of THD technical conferences. Last fall, NURETH-16 was held in Chicago, Illinois, marking the return of the premier thermal hydraulics conference to the United States after 8 years. At the meeting in New Orleans, the embedded ATH '16 (Advances in Thermal Hydraulics) topical will be held, with over 40 full pages presented. THD sessions in both the ANS Winter and Annual Meetings have also been held.

Later in 2016, THD is a co-sponsor of the 11th International Topical Meeting on Nuclear Reactor Thermal-Hydraulics, Operation and Safety (NUTHOS-11) in Gyeongju, Korea and a sponsor of the 2016 International Topical Meeting on High Temperature Reactor Technology (HTR2016) at the 2016 ANS Winter meeting in Las Vegas. In September 2017, the NURETH-17 will be held in Xi'an, China.

Speaking of our technical program, I also want to thank the members of our Program Committee and the active reviewers for topical and Winter/Annual meetings. Without your support, the vibrancy of our technical programs could not be maintained. In particular, I want to thank Prof. Xiaodong Sun, who is completing his 3 year as Program Committee Chair with the Annual Meeting in New Orleans, and Dr. Elia Merzari, who will be succeeding him in this role.

The Annual Meeting also marks the changing of the guard for THD Officers and, therefore, the end of my term as Chair of our division. Prof. Seungjin Kim will be stepping in to take on this role. I hope that he can rely on the same strong, broad support for the division that I have. Of particular note, Dr. Kurshad Muftuoglu has served as division secretary and Dr. David Pointer has served as treasurer for the past 12 months. Dr. Pointer will be moving to secretary for 2016-17, while Dr. Muftuoglu will take on the role of vice-chair.

I'd also like to note changes in two of our main volunteer positions. Mr. Lane Carasik will step down as webmaster, with Dr. Dillon Shaver taking on this role. Our current YMG liaison (Dr. Brian Collins) will also be replaced by Dr. Alex Abboud.

If you are interested in getting more involved with the division's activities, please do not hesitate to contact me or Prof. Kim or to attend our division meetings in New Orleans. We will meet on Sunday in "STRAND 12A" during, with the Program Committee meeting from 2:30-4:30 pm and the Executive Committee from 4:30-6:00 pm.

Regards,

DuWayne Schubring, Ph.D.  
2015-6 THD Chair  
Assistant Professor, University of Florida  
dlschubring@ufl.edu

## Honors and Awards Committee Report

The winner of the 2015 Thermal Hydraulics Division Technical Achievement Award was Professor Mohamed S. El-Genk, Regents' Professor of Nuclear, Mechanical, Chemical and Biological Engineering and Founding Director of the Institute for Space and Nuclear Power Studies at the University of New Mexico. He received this award for his outstanding contributions to the areas of space nuclear power thermal hydraulics, natural and combined convection heat transfer, boiling and two-phase flow, advanced reactor concept design and, as indicated by the citation that appeared on his award plaque, "in

recognition of his exceptional contributions to the understanding of terrestrial and space reactor thermal

hydraulics phenomena and for his impact on the thermal hydraulics community as a researcher, educator, and leader." During the Technical Achievement Award Special Session held at the 2015 ANS Winter Meeting, Professor El-Genk delivered a lecture entitled "A Journey with Thermal-Hydraulics."

The Technical Achievement Award is the highest award of the THD and we ask for nominations. The deadline for submission is July 1, 2016. The details including the award form can be found at <http://thd.ans.org/awards/>



*From Left to Right: Prof. Brian Woods, Prof. Mohamed S. El-Genk, Prof. DuWayne Schubring.*



*From Left to Right: Dr. Tarek Zaki, Prof. Brian Woods, Prof. DuWayne Schubring.*

In addition to the Technical Achievement Award, THD also selected a best paper award for 2015—“Use of White Noise in TRACE/PARCS Analysis of ATWS with Instability” by Tarek Zaki and Peter Yarsky, published in the Proceedings of the 16th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-16), Chicago, Illinois, August 30-September 4, 2015.

Brian Woods  
Oregon State University  
2015-2016 Honors and Award Committee Chair  
ANS Thermal Hydraulics Division  
brian.woods@oregonstate.edu

## Program Committee Report

The strong THD presence at the ANS national meetings continues after a very positive 2015 ANS Winter Meeting where a total of 65 summaries were presented at eleven THD-sponsored sessions. The interest and participation to the technical sessions organized by our division have maintained a good level at the upcoming 2016 ANS Annual Meeting, despite several competing conferences in the first half of 2016. Thanks to the support of the session organizers, contributing authors and panelists, and reviewers, the program committee has put together another strong arrangement of sessions for the meeting, which includes the embedded topical meeting Advances in Thermal Hydraulics 2016 (ATH'16).

At the 2016 Annual Meeting in New Orleans, LA, THD is organizing a total of three contributed summary sessions in addition to ATH'16. A total of 23 summaries were submitted, out of which, based on the reviewer recommendations, a total of 18 summaries are expected to be presented at this Annual Meeting. Again, let us take this opportunity to thank the session organizers and reviewers for their wonderful efforts: nearly 84 reviews were completed for this Annual Meeting (on average, over 4 reviews per paper). These sessions, in chronological order, are:

Computational Thermal Hydraulics – I [Mon. p.m.]  
 General Thermal Hydraulics [Tue. p.m.]  
 Computational Thermal Hydraulics – II [Wed. p.m.]

The Embedded Topical Meeting on Advances in Thermal Hydraulics 2016 will start Monday June 13<sup>th</sup>, 2016 afternoon and continued through Thursday morning June 16<sup>th</sup> concurrently with the Annual Meeting. A total of 45 full papers were submitted, out of which based on reviewer recommendation, a total of 43 papers are expected to be presented in a total of ten technical sessions:

- Code Development and Applications [Mon. p.m.]
- Computational Methods, Modeling, Verification/Validation – I [Tue. p.m.]
- Experimental Methods and Instrumentation [Wed. a.m.]
- Nuclear Reactor Plant Thermal Hydraulics and Safety [Wed. a.m.]
- Two-Phase Flow and Heat Transfer Fundamentals – I [Wed. 1:00 p.m.]
- Best Estimate LOCA [Wed. 1:00 p.m.]
- Gas-Cooled Reactors [Wed. p.m., immediately following the Best Estimate LOCA session]
- Two-Phase Flow and Heat Transfer Fundamentals – II [Wed. 4:00 p.m.]
- Computational Methods, Modeling, Verification/Validation – II [Thu. a.m.]

In addition to these sessions a plenary session is planned for Tuesday morning dedicated to the Fukushima accident titled: **“Opening Plenary - Five**

**Years After the Fukushima Incident.”** The plenary sessions will feature a panel with world renowned experts in thermal-hydraulics and safety analysis. Abstracts of the talks are included in the proceedings of the meeting.

The 2016 ANS Winter meeting is scheduled to take place in Las Vegas, Nevada on November 6–10, 2016. The call for papers has been issued and papers are currently due on June 10<sup>th</sup>, 2016. All THD members are encouraged to submit and attend: THD is poised to have a very strong presence. The division is currently organizing nine contributed paper session, in addition to a panel:

- 19a. General Thermal Hydraulics
- 19b. Experimental Thermal Hydraulics
- 19c. Computational Thermal Hydraulics
- 19d. Two-Phase Flows
- 19e. Subchannel Thermal-Hydraulic Analysis
- 19f. Uncertainty, Scaling and Global Sensitivity Methods in Thermal Hydraulics
- 19g. Advanced Instrumentation in Reactor Thermal Hydraulics
- 19h. Severe Accident Modeling and Experiments for Advanced Reactor Safety
- 19i. Young Professional Thermal-Hydraulics Research Competition (YMG)

We note that in addition to the the regular sessions, THD will also co-sponsor the 8th International Topical Meeting on High Temperature Reactor Technology (HTR2016). Submissions for the meeting are already closed.

The 11<sup>th</sup> International Topical Meeting on Nuclear Thermal Hydraulics, Operation and Safety (NUTHOS-11) will be held on October 9-14, 2016 in Gyeongju, Republic of Korea. The conference is sponsored by Korean Nuclear Society (KNS) and co-sponsored by ANS in cooperation with other international nuclear societies. Please see the conference website <http://www.nuthos-11.org> and a related article in this Newsletter (I suppose we have one?) for future information.



The 17<sup>th</sup> Internal Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-17) will be held in Xi'an, China on September 3-8, 2017. Please see the conference website <http://nureth17.com> and a related article in this Newsletter (I suppose we have one?) for future information.

In New Orleans, at the 2016 ANS Annual Meeting, the THD Program Committee meeting will be held on Sunday June 12<sup>th</sup>, 2016, starting at 2:30 p.m in room Strand12A. Anyone interested in the program committee activities is invited to participate.

Finally, we would like to express our gratitude to all of the colleagues who devote your time to the Division's activities. Thanks to your dedicated efforts, we are able to put together strong programs at many meetings. These meetings remain as the prominent venue for scientific information exchange in the thermal-hydraulics community. As always, we would like to encourage our members to actively participate by attending our meetings, submitting papers/summaries, volunteering to organize sessions, and supporting the peer-review of the papers. We look forward to many more successful years.

Xiaodong Sun, Ohio State University  
2013-16 THD Program Committee Chair  
Elia Merzari, Argonne National Laboratory  
2013-16 THD Program Committee Assistant Chair  
PCChair@thd-ans.org

## Treasurer's Report

Our division holds two separate accounts: one general and one scholarship/awards account (formerly referred as the *endowment account*). Spending from the general account is unrestricted up to the total value of the account, as long as the transactions are approved by the division executive committee. Spending from the awards account is restricted to ensure the long term availability of the fund to support the THD awards.

The general fund is supported by membership dues and income from conferences hosted by the division. The scholarship/awards account has primarily been funded by generous donations from the organizers of conferences supported by the division.

The 2014 year-end scholarship/awards fund balance was \$39,061. In 2015, funds were corrected to be shown as \$18,485 in Division-Designated Funds and \$20,576 in Temporarily Restricted funds, with the latter being gifts or donations to the fund. A past error in assignment of interest allocation was corrected, resulting in a gain of \$2,943. 2015 investments resulted in a net loss of \$129. In 2015, the Atomic Energy Society of Japan (AESJ) generously donated \$4000 to the scholarship/award fund following the successful completion of NUTHOS-10. Spending through the end of December 2015, was limited to \$76 for plaques and certificates. Anticipated spending As of December 31, 2015, the scholarship/award fund balance is \$45,799. The spend limit for 2016 is \$4,139.

Scholarship/award account balances are reported annually so no update of investment returns for the first half of 2016 is available. No expenses have been recorded to date.

The general fund account balance is summarized below:

## 2016 Division Financial Report

	Budget	Actual Thru 3/31/2016
<b>Balance forward from 2015</b>		
• Meeting revenue of \$30,996 from NURETH-16	<b>\$15,809</b>	<b>\$47,128</b>
<b>2016 Income</b>	<b>\$3,800</b>	<b>\$596</b>
• Revenue from 2016 member allocation	\$2,300	\$596
• Revenue from ATH meeting	\$1,500	\$0
<b>2016 Expenses</b>	<b>\$4,400</b>	<b>\$1,000</b>
• Awards and Plaques	\$500	\$0
o \$500 to support Young Professional Paper Contest		
• Student Support	\$3,400	\$1000
o \$500 to support ANS Student Travel Fund		
o \$500 to support ANS Student Conference		
o \$2400 for THD Directed Student Travel Support		
• Scholarship/NEED funding	\$500	\$0
o ANS directed scholarship fund		

David Pointer,  
pointerwd@ornl.gov  
2015-2016 Treasurer  
ANS Thermal Hydraulics Division

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## Nominating Committee Report and Division Contact Information

Current Division Officers and Executive Committee members are listed below.

### Current THD Officers (July 2015 – June 2016)

Division Chair:

DuWayne Schubring, dlschubring@ufl.edu

Vice Chair/Chair-Elect:

Seungjin Kim, skim@psu.edu

Secretary:

Kurshad Muftuoglu, kurshad.muftuoglu@ge.com

Treasurer:

W. David Pointer, pointerwd@ornl.gov

### Executive Committee Members

Fan-Bill Cheung (2017) fxc4@psu.edu

Jong Kim (2017) jongkim@mail.kaist.ac.kr

Seungjin Kim (2016) skim@psu.edu

Kurshad Muftuoglu (2016)

kurshad.muftuoglu@ge.com

DuWayne L. Schubring (2016) dlschubring@ufl.edu

W. David Pointer (2016) pointerwd@ornl.gov

Xu Cheng (2018) xu.cheng@kit.edu

Paolo Ferroni (2017) ferronp@westinghouse.com

Donna P. Guillen (2017) donna.guillen@inl.gov

Chul-Hwa Song (2018) chsong@kaeri.re.kr

Igor A. Bolotnov (2016) igor\_bolotnov@ncsu.edu

Lane B. Carasik (2016) lcarasik@tamu.edu

Elia Merzari (2016) emerzari@anl.gov  
Michio Murase (2016) murase@inss.co.jp  
Donald Todd (2016) donald.todd@angstrom.tech  
Wade R. Marcum (2017)  
wade.marcum@oregonstate.edu  
Jeffrey W. Lane (2018) LaneJW@zachrygroup.com  
Philippe M. Bardet (2018) bardet@gwu.edu  
Si Young Lee (ex-officio) si.lee@srnl.doe.gov  
Hans Gougar\* hans.Gougar@inl.gov

\* *Chair of the ANS Professional Divisions  
Committee, ex-officio member without vote*

### Committee Chairs (July 2015– June 2016)

Program Committee:  
Xiaodong Sun, sun.200@osu.edu

Honors and Awards Committee:  
Brian Woods, woodsb@engr.orst.edu

Nominating Committee:  
Si Young Lee, si.lee@srnl.doe.gov

Membership Committee:  
Si Young Lee, si.lee@srnl.doe.gov

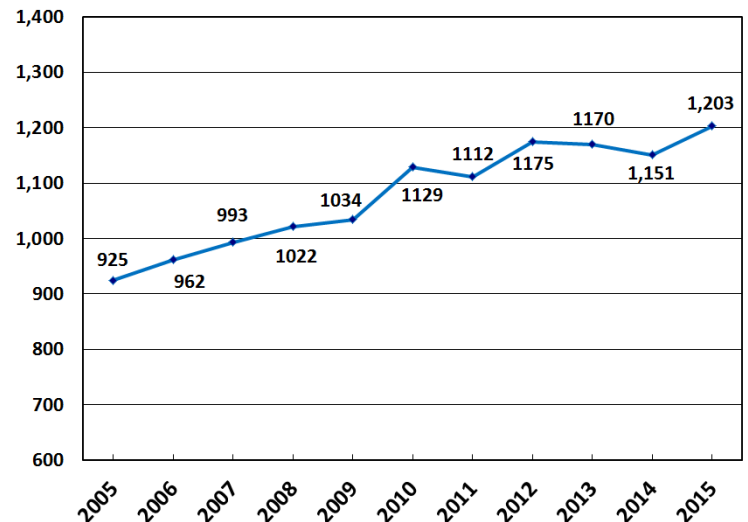
The Nominating Committee is responsible for the nomination of THD members to leadership positions on both the Program and Executive Committees. The THD would like to encourage members interested in becoming more involved to contact one of the officers listed above. In particular, the division is usually in need of volunteers for technical meeting session organizers and paper reviewers.

Si Young Lee  
Savannah River National Laboratory  
2015-2016 Nominating Committee Chair  
ANS Thermal Hydraulics Division  
si.lee@srnl.doe.gov

## Membership Committee Report

As shown in the THD Annual Membership graph below, the division membership steadily grew over the past ten years considering some fluctuations. We now boast 1203 members, representing about 12% of the total ANS membership with about 16% THD student members in 2015. From 2005 through 2012, the percentage of ANS members that chose to THD members has steadily increased. The student membership in THD has similar trends to the overall membership. It has increased approximately 27% from 2005 to 2012 before leveling out.

**Thermal Hydraulics Division**  
**Annual Membership**



In addition to healthy overall and student membership trends, THD members come from all aspects of the nuclear industry, representing students, universities, consulting firms, National Labs, utilities, and architects/construction firms. The THD Membership Committee (MC) cordially invites you to become a member of the Division and participate in the Division's activities. Current activities of the Division include paper review, paper presentation, organizing and chairing technical sessions, sponsoring topical meetings, serving on the various subcommittees, and supporting student conferences. If you are interested in becoming a member of THD, you can contact ANS MC directly. If you are

currently a member and interested in any of the above activities, please contact any of the THD Officers.

Si Young Lee  
Savannah River National Laboratory  
2015-2016 Membership Committee Chair  
ANS Thermal Hydraulics Division  
si.lee@srnl.doe.gov

## Young Professional Report

The 2015 annual "Young Professional Thermal Hydraulics Research Competition" was held in Washington, DC on Wednesday November 11th, 2015. The session, which featured presentations from young researchers in academia and national labs, was well attended. A panel of judges selected Noah Weichselbaum of George Washington University as the winner of the competition with a talk titled "Fluid Structure Interaction Measurements of a PWR Fuel Bundle with Seismic Forcing."

The next annual "Young Professional Thermal Hydraulics Research Competition" is to be held during the 2016 ANS Winter Meeting in Las Vegas, Nevada. This competition has received a sustained stream of summaries in recent years, demonstrating the continued interest in this activity. Submission for this competition is still open, and summaries are currently due on June 10th, 2016. For more information, please see THD website at: [http://thd.ans.org/wp-content/uploads/2015/03/YPTHRC16\\_flyer.pdf](http://thd.ans.org/wp-content/uploads/2015/03/YPTHRC16_flyer.pdf) or contact Drs. Rui Hu (rhu@anl.gov) or Paolo Ferroni (ferronp@westinghouse.com).

The Young Members Group (YMG) is a technical group of the American Nuclear Society (ANS). YMG provides young professionals with opportunities to expand their technical knowledge and network with internationally recognized authorities and industry leaders. Part of YMG's mission is to collaborate with other Divisions and Groups in developing technical and non-technical content of particular interest to young professionals for topical and national meetings

(for more information on YMG's mission check <http://ymg.ans.org>).

All regular ANS members 35 years old or younger, or within 5 years of their last degree are YMG members. Moreover all ANS graduate students are members of the group as well. The next YMG program/executive committee meeting will be held at 2016 ANS Annual Meeting in New Orleans on Monday June 13th (10:00 AM - 1:00 PM) in room Strand12B. Please come and join us!

Elia Merzari, [merzari@anl.gov](mailto:merzari@anl.gov)

## Upcoming THD Conferences

- International Topical Meeting on Advances in Thermal Hydraulics 2016 (**ATH'16**) embedded as a part of 2016 ANS Annual Meeting (New Orleans, LA): June 12-16, 2016.
- 11th International Topical Meeting on Nuclear Thermal-Hydraulics, Operation and Safety (**NUTHOS-11**) Gyeongju, Korea October 9-13, 2016.
- 17<sup>th</sup> International Topical Meeting on Nuclear Reactor Thermal Hydraulics (**NURETH-17**) Xi'an, Shaanxi, China September 3-8, 2017.



## NUTHOS-11 Report

NUTHOS-11, the 11th International Topical Meeting on Nuclear Thermal Hydraulics, Operations and Safety, will take place In October 9-13, 2016 in Gyeongju, the millennial capital city of Sylla Dynasty of Korea (57 BC – 935 AD).

Endowed with Korea's long history and traditional culture, Gyeongju boasts four UNESCO world heritages: Seokguram Grotto, Bulguksa Temple, Gyeongju Historic Area, and Yangdong Village.

The conference promises to be the largest and most successful NUTHOS in both technical contents and side programs of cultural and historical nature.

We welcome you all to NUTHOS-11 and encourage you to bring your family and friends to sample the culture of Korea in the midst of splendor of Gyeongju.

Authors are invited to submit a one-page 500 word abstract (text only) to the NUTHOS-11 website <http://www.nuthos-11.org> no later than Dec. 15, 2015. The review results will be sent to the corresponding authors by the end of January 31, 2016.

Please visit the website (<http://www.nuthos-11.org/>) and ask further information by emailing to [info@nuthos-11.org](mailto:info@nuthos-11.org).

Chul-Hwa SONG, Ph.D.  
NUTHOS-11 TPC Chair  
Director,  
Korea Atomic Energy Research Institute (KAERI)  
[chsong@kaeri.re.kr](mailto:chsong@kaeri.re.kr)

## NURETH-17 Report

NURETH-17 will take place for the first time ever in China, from September 3rd to September 8th, 2017 in the beautiful historical capital -- Xi'an. Since the awarding of hosting this conference in May 2015, the preparation for this conference has gone in full gear. As of today, various organizing committees have been established or nearly completed. The website for this conference has been up and running since June 15th, 2015 (<http://www.nureth17.com/> or [nureth17.xjtu.edu.cn](http://nureth17.xjtu.edu.cn)). The venue has been reserved at Xi'an International Conference Center which has over 50 conference rooms. Five hotels have been reserved with total over 900 rooms, pricing from 80 to 150 USD (tax included). The technical program at this point includes 9 topics with 67 sub-topic sections and 8 special topics. The first Call for Paper draft has been released (see attached).

Dr. Bao-Wen Yang  
Dean, Professor  
School of Nuclear Science and Technology  
Xi'an Jiaotong University  
[bwy@mail.xjtu.edu.cn](mailto:bwy@mail.xjtu.edu.cn)



## First Announcement and Call for Papers

# NUTHOS-11

11th International Topical Meeting on Nuclear Thermal-Hydraulics, Operation and Safety

October 9 – 13, 2016 HICO, Gyeongju, Korea

### About the Symposium

In October 2016, the 11th International Topical Meeting on Nuclear Thermal Hydraulics, Operations and Safety (NUTHOS-11) will take place in Gyeongju, the millennial capital city of Sylla Dynasty of Korea (57 BC – 935 AD). Endowed with Korea's long history and traditional culture, Gyeongju boasts four UNESCO world heritages.

Thanks to the success of the previous conferences, NUTHOS now firmly stands in the international nuclear community as one of the major international nuclear conferences. The first NUTHOS was held in Taipei in 1984 followed by Tokyo (1986), Seoul (1988), Taipei (1994), Beijing (1997), Nara (2004), Seoul (2008), Shanghai (2010), Kaohsiung (2012), and Okinawa (2014).

We welcome you all to NUTHOS-11 and encourage you to bring your family and friends to sample the culture of Korea in the midst of splendor of Gyeongju.

### Organizers

#### Honorary Chairs

- Prof. Jong H. Kim (KAIST, Korea)
- Prof. Guanxing Li (CNS, China)
- Prof. Bal Raj Sehgal (KTH, Sweden)

#### General Chairs

- Prof. Moo Hwan Kim (POSTECH & KINS, Korea)
- Prof. Yassin A. Hassan (TAMU, USA)
- Prof. Hisashi Ninokata (POLIMI, Italy)

#### Financial Committee Chair

- Dr. B.N. Kim (KHNP, Korea)

#### Organizing Committee Chairs

- Prof. Hyun Sun Park (POSTECH, Korea)
- Dr. Elia Merzari (ANL, USA)
- Prof. Yong Hoon Jeong (KAIST, Korea): Assistant Chair

#### Organizing Committee Members

- Dr. S.W. Bae (KAERI, Korea)
- Prof. I.C. Bang (UNIST, Korea)
- Mr. B.J. Cho (KORAD, Korea)
- Prof. H.K. Cho (SNU, Korea)
- Dr. A.J. Jeong (KINS, Korea)
- Prof. K.Y. Lee (HGU, Korea)
- Mr. S.T. Yang (KHNP, Korea)

#### Technical Program Committee Chairs

- Dr. Chul-Hwa Song (KAERI, Korea)
- Prof. Xu Cheng (SJTU and KIT, Germany)
- Prof. Koji Okamoto (U. Tokyo, Japan)
- Prof. Xiaodong Sun (OSU, USA)
- Dr. Ki-Yong Choi (KAERI, Korea): Assistant Chair
- Prof. Seungjin Kim (PSU, USA): Assistant Chair

#### International Steering Committee Chairs

- Prof. Goon Cherl Park (SNU, Korea)
- Dr. Bingde Chen (NPIC, China)
- Dr. Si Young Lee (SRNL, USA)
- Dr. Kaichiro Mishima (INSS, Japan)

#### International Steering Committee Members

- Dr. Won Pil Baek (KAERI, Korea)
- Prof. Kwang Hyun Bang (KMOU, Korea)
- Dr. Young Seok Bang (KINS, Korea)
- Dr. F. Barre (IRSN, France)
- Dr. Jason Chao (United Nuclear, USA)
- Dr. Luis E. Herranz Puebla (CIEMAT, Spain)
- Dr. Yanping Huang (NPIC, China)
- Dr. Jong-Ho Lee (KHNP, Korea)
- Dr. K. Muftuoglu (GEH, USA)
- Dr. Hideo Nakamura (JAEA, Japan)
- Dr. N. Nitheanandan (CNL, Canada)
- Dr. Jovica Riznic (CNSC, Canada)
- Prof. A. Yamaguchi (U. Tokyo, Japan)
- Prof. Bao-Wen Yang (XJTU, China)

### Website and further information

<http://www.nuthos-11.org/> (mailto: info@nuthos-11.org)

## Preliminary Topics

### 1. Fundamentals of Thermal Hydraulics

- 1.1 Single- and Two-Phase Flow Fundamentals
- 1.2 Sub-channel Flow Dynamics and Analysis
- 1.3 CHF and Post-CHF Heat Transfer
- 1.4 Boiling and Condensation Heat Transfer
- 1.5 Nano-Fluid Thermal-Hydraulics

### 2. Computational Thermal-Hydraulics

- 2.1 Advances in Numerical Methods and Modeling
- 2.2 Code Development and V&V
- 2.3 CFD Application to Nuclear Reactor System Design and Safety Analysis
- 2.4 Multi-Scale and Multi-Physics Calculations
- 2.5 Accuracy and Uncertainty Analysis including CFD Codes

### 3. Experimental Thermal-Hydraulics

- 3.1 Experiments for Code Verification and Validation
- 3.2 Containment Analysis and Experiments
- 3.3 Steam Generator Thermal-Hydraulic Experiment and Analysis
- 3.4 Passive System Performance and Analysis

### 4. Multi-disciplinary Thermal-Hydraulics

- 4.1 Thermal Hydraulic Loads and Flow-Induced Vibration
- 4.2 Thermal Hydraulics Related to Nuclear Fuel Safety
- 4.3 Thermal Hydraulics with Materials and Water Chemistry
- 4.4 Multi-Physics Experiments and Analysis

### 5. Severe Accidents

- 5.1 Severe Accident Analysis and Accident Management
- 5.2 Degraded Core Thermal Hydraulics
- 5.3 Fuel-Coolant Interaction and Steam Explosion
- 5.4 Hydrogen and Fission Product Behavior
- 5.5 Advanced Design Features for Severe Accident Mitigation

### 6. Plant Operation and Maintenance

- 6.1 Plant Transients and Accidents Analysis and Testing
- 6.2 Plant Licensing Renewal and Life Extension
- 6.3 Plant Reliability Improvement and Safety Culture
- 6.4 Risk-Informed and Performance-Based Regulation
- 6.5 Application of Big Data for Plant Diagnosis

### 7. Plant Diagnostics and Monitoring

- 7.1 Steam Generator Operation and Maintenance
- 7.2 Plant Simulators, Analyzers, Operator Training
- 7.3 Probabilistic Risk Analysis to Design, Operation and Maintenance
- 7.4 Waste Management and Spent Fuel Pool Thermal Hydraulics
- 7.5 Environmental Nuclear Safety

### 8. Advances in Measurements and Instrumentations

- 8.1 Advanced Flow Visualization Techniques
- 8.2 Advanced Radiation Measurement and Techniques
- 8.3 Advanced Measurement Techniques in Non-Water, Extreme Environment
- 8.4 Application of Innovative Measurement Technology

### 9. Thermal-Hydraulics and Safety of Advanced Reactors

- 9.1 SFR Thermal Hydraulics, Design and Safety Analysis
- 9.2 Gas Cooled Reactor Thermal Hydraulics, Design and Safety Analysis
- 9.3 MSR Thermal Hydraulics, Design and Safety Analysis
- 9.4 Supercritical Reactor Thermal Hydraulics
- 9.5 Research Reactor Operation and Thermal Hydraulics
- 9.6 SCO<sub>2</sub>-Based Technology

### 10. Special Topic Sessions

- 10.1 Containment Thermal-Hydraulics
- 10.2 Hydrogen Management
- 10.3 SMR
- 10.4 Safety Analysis of Design Extension Conditions
- 10.5 Coolability of Damaged Fuels
- 10.6 Scaling Issues
- 10.7 CANDU Thermal-hydraulics and Safety
- 10.8 Filtered Containment Venting System (FCVS)
- 10.9 OECD/NEA International Programs

### 11. Invited Panel Sessions

### 12. Tutorials

## Important Dates

December 15, 2015	Submission of abstract
January 31, 2016	Notification of abstract acceptance
April 20, 2016	Submission of full-paper
June 15, 2016	Full-paper acceptance notification
July 15, 2016	Submission of final full-paper
August 31, 2016	Last day of pre-registration
October 9, 2016	Date of meeting

## Submission of Abstract

Authors are invited to submit 500 word abstract (text only) to the NUTHOS-11 Website (<http://www.nuthos-11.org>) no later than **Dec. 15, 2015**.

The review results will be sent to the corresponding authors by the end of **January 31, 2016**.

## Sponsors

<b>KNS</b>	Korean Nuclear Society
<b>ANS</b>	American Nuclear Society
<b>KSFM</b>	Korean Society for Fluid Machinery
<b>AESJ</b>	Atomic Energy Society of Japan
<b>CNS</b>	Chinese Nuclear Society
<b>CNS</b>	Canadian Nuclear Society
<b>SNE</b>	Spanish Nuclear Society
<i>To be added</i>	





# NURETH-17



## Call for Papers

September 3–8, 2017  
Qujiang Int'l Conference  
Center, Xi'an, China

### Honorary Chair

S. Wang (President, XJTU)

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H. Zhao (CGNPC)

## Important Dates

Abstract Submission Deadline: November 15, 2016

Abstract Acceptance: January 3, 2017

Full-Length Paper Submission: March 3, 2017

Review Notification: April 30, 2017

Final Paper: June 5, 2017

The proceeding will be distributed in the form of a flash drive. The page limit for NURETH-17 papers is 14 pages and the file size should be less than 10MB. Selected papers will be invited to submit for publication in a special edition of an international journal (*Nuclear Engineering and Design*, *Nuclear Technology*, *Nuclear Science and Engineering*).

## About the Meeting

The Chinese Nuclear Society (CNS) and Xi'an Jiaotong University (XJTU) are pleased to host the 17th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-17) at the Qujiang International Conference Center, Xi'an, Shaanxi, China, on September 3–8, 2017. Xi'an, one of the most accessible destinations in China, is the oldest Chinese capital city for 13 dynasties. World renowned cultural heritages of the city include the Terracotta Warriors and Horses, the Mausoleum of Emperor Qin Shi Huang, the City Wall of Ming Dynasty, the Forest

of Stone Steles from the Han Dynasty, the Tang Dynasty Cultural Theme Park, the Shannxi History Museum, the Big Wild Goose Pagoda, and the Qujiang New District – just to name a few. Participants will have the opportunity to enjoy China's splendid ancient civilization in this beautiful city while attending the meeting. The weather in Xi'an is usually very nice in September.

China has the largest numbers of nuclear power plants under development in the modern world, including the on going efforts in the HTGR project and CAP1700, the highest-power PWR ever attempted by mankind. Following the success of the past NURETH meetings, NURETH-17 aims to provide a forum for international experts and researchers in the field of nuclear reactor thermal hydraulics to share their research and discuss future developments. It will also be a venue for organizations to showcase their expertise in nuclear reactor technology and exhibit their products and services to the nuclear reactor thermal-hydraulics community.

Blocks of rooms in selected world-class hotels within walking distance from the Conference Center will be reserved for NURETH-17 participants. Ground transportation from airport to these hotels will be provided to participants free of charge.

Inquiry: [nureth17@mail.xjtu.edu.cn](mailto:nureth17@mail.xjtu.edu.cn)





# M&C 2017 CALL FOR PAPERS

International Conference on Mathematics &  
Computational Methods Applied to Nuclear Science & Engineering

April 16-20, 2017, Jeju, Korea

The ANS M&C 2017 meeting will take place in Jeju, Korea, which is a beautiful semi-tropical island providing a relaxing and friendly environment. The reactor physics and computational science division (RPCSD) of the Korean Nuclear Society (KNS) will host the conference with the support of the strong nuclear industry of Korea in which 24 power reactors are operating to supply about 35% of the national electricity production. The subject areas span not only the traditional transport and reactor physics analysis methods, but also computational thermal-hydraulics, materials science and fusion to reflect the remarkable advances in the computational methods in various fields of nuclear science and engineering. **Four-page** extended summaries are solicited in the following subject areas:

## Subject Areas

- 1 Deterministic Transport Methods and Applications
- 2 Monte Carlo Methods and Applications
- 3 Nuclear Data Evaluation and Assimilation of Integral Experiments
- 4 Subcritical System Analysis Methods
- 5 Uncertainty Quantification and Sensitivity Analysis
- 6 General Reactor Analysis Methods and Applications
- 7 Computational Fluid Dynamics
- 8 Computational Nuclear Thermal-Hydraulics
- 9 Multiphysics Power Reactor Simulation
- 10 Computational Materials Science
- 11 Modeling and Simulation for Fusion Energy Systems
- 12 High Performance Computing for Nuclear Applications

All the classical subjects in each subject area are considered within the scope of the conference. In addition, there will be subjects of special interest as listed on the second page. After the conference, selected papers will be published in a special issue of the KNS journal of Nuclear Engineering and Technology.

The conference will be held at the International Convention Center Jeju which is a top-notch convention facility located in the Jungmun resort complex housing wonderful hotels and amusement facilities at the gorgeous southern seafront of Jeju. Please join the conference to present your work to the worldwide nuclear engineering mathematics and computation community and to enjoy the opportunity of relaxation.

The template of the **two-column** extended summaries can be found in the following site. Please limit the summary to 4 pages and submit your summary by **October 15, 2016**.

Template and Instruction Download Site : [www.mc2017.org](http://www.mc2017.org)

## Due Dates

- |                      |                   |
|----------------------|-------------------|
| • Extended Summary   | October 15, 2016  |
| • Review Result      | December 17, 2016 |
| • Full Paper         | February 18, 2017 |
| • Early Registration | March 4, 2017     |



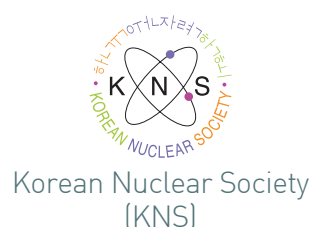
## Subjects of Special Interest

(not exhaustive)

- Whole Core Modeling and Simulation
- Massively Parallel Transport Solution Algorithms
- Transport Methods for Stochastic Media
- Charged Particle Transport and Applications
- Monte Carlo Simulation with Thermal Feedback
- Next Generation Parallelism for Monte Carlo Simulation
- Monte Carlo Variance Reduction and Hybrid Methods
- Nuclear Theories, Models and Data Evaluation
- Validation and Assimilation of Nuclear Data
- Subcriticality Measurement and Online Monitoring Techniques
- Spent Fuel Cask/Storage Analyses
- Uncertainty Quantification in Multiphysics Simulation
- Deterministic and Stochastic Methods for Sensitivity Analysis
- Advances in Self Shielding Methods
- Next Generation Cross Section Homogenization Methods
- Validation with Realistic Core Benchmarks
- Massive Computational Fluid Dynamics Nuclear Applications
- Advances in System Scale Computational Fluid Dynamics
- Novel Approaches for Single and Multiphase Fluid Dynamics
- Multiscale Methodologies and Applications in Thermal Hydraulics
- Advances in Computational Methods for Nuclear Thermal Hydraulics
- Multiphysics Coupling Methods and Approaches
- Validation and Regulatory Acceptance of Multiphysics Simulations
- Multiscale Modeling of Structural Materials and Nuclear Fuels
- Advanced Methods for Simulating Primary Radiation Damage and its Evolution in Materials
- Theory and Simulation of Fusion Plasma Confinement, Stability and Heating
- Simulation and Integrated Modeling of Burning Plasma and Fusion Energy Systems
- Advanced Methods to Exploit the Potential of Next-Generation Architectures
- Application of Leadership-class Computing to Nuclear Applications
- Implications of Changes to Computing Hardware on Future Methods

More detailed subjects can be found on the conference website under technical program/subjects.

## Meeting Organizers



Korea Atomic Energy Research Institute (KAERI)

Seoul National University (SNU)

Korea Advanced Institute of Science and Technology (KAIST)

Ulsan National Institute of Science and Technology (UNIST)

## Hosts

- General Chair: **Nam Zin Cho** (KAIST, nzcho@kaist.ac.kr)
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- **Won Sik Yang** (Purdue, yang494@purdue.edu)
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