



## Your THD Leadership Team

We all thank you for joining THD and look forward to working with you to advance our field. Please do not hesitate to reach out to anyone on the leadership team with suggestions or if you'd like to get involved.

### Officers

**Chair**  
Elia Merzari  
[ebm5351@psu.edu](mailto:ebm5351@psu.edu)

**Vice Chair/Chair-Elect**  
Bao-Wen Yang  
[bwyo1@deltaenergygroup.com](mailto:bwyo1@deltaenergygroup.com)

**Secretary**  
Annalisa Manera  
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**Treasurer**  
Igor Bolotnov  
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**Immediate Past Chair**  
Wade R. Marcum  
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**Executive Committee**  
**Terms Expiring June 2022**  
Fatih Aydogan  
Igor Bolotnov  
Lane Carasik  
Yassin Hassan  
Robert P. Martin

**Terms Expiring June 2023**  
Yang Liu  
John Luxat  
Hiashi Ninokata  
Piyush Sabharwall  
Caleb Brooks

**Terms Expiring June 2024**  
Xiaodong Sun  
Dillon Shaver  
W. David Pointer  
Hyoung Cho  
M. Moussaoui

**Standing Committees**  
**Technical Program Chair**  
Igor Bolotnov

**Honors & Awards Chair**  
Xiaodong Sun

**Nomination Chair**  
Wade R. Marcum

**Webmaster**  
Marilyn Delgado

**Membership Chair**  
Wade Marcum

**Screening Committee Chair**  
Fan-Bill Cheung

**YMG Liaison**  
Mathew D. Zimmer

## A Message from the Chair

Dear Colleagues,

I feel a great honor and privilege to be able to write to you as chair of the Thermal-hydraulics division. It is also definitely humbling to follow in the steps of so many great colleagues, outstanding scientists and engineers and giants of the field that have held this position before. Our division has had a long and storied history (i.e., we recently celebrated the 40<sup>th</sup> year anniversary of the first NURETH meeting), but I firmly believe our best days lie ahead. There is a growing recognition both nationally and internationally for the potential of advanced nuclear reactors to power the transition to a low carbon economy. Thermal-hydraulics art and science, are bound to play a pivotal role in these efforts as advanced reactor designs, which aim typically at much higher temperatures than light water reactors, face several thermal hydraulics challenges. I look at the future with great optimism considering these positive developments.

We need to recognize however, that the past two years have been wrought with serious challenges. Our industry has been plagued by plant closures and delays in the construction of new plants. Nuclear power plants, especially in the United States, continue to struggle to remain competitive, although some government relief has started to merge, most recently in Illinois. Furthermore, the COVID-19 pandemic, which is still ongoing, has hampered our capacity to meet as a community, leading to the cancellation of the 2020 ATH and NUTHOS meetings. In 2021 THD will not host any topical meeting again, marking now a two year hiatus in topical meetings, for the first time in over 20 years. I suspect that the deep and full impact of the pandemic, especially in education, will be felt and not fully understood for years to come.

Furthermore, in the past 20 years, the focus of THD has been in serving the technical community by hosting high quality technical excellence through a vibrant award program targeted to all stages of a professional career. THD has been remarkably successful at this: NURETH remains the most important meeting



in the thermal-hydraulics field and it is one of the largest meetings hosted by ANS; our award program remains the most prestigious both nationally and internationally. In recent years THD has introduced two new scholarships and two news awards, a testament to our commitment to serve the community. Despite these successes our membership, which was on a strong

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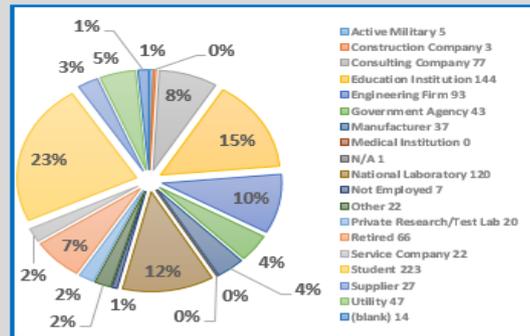
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## Membership Committee Report

Nuclear Engineer	363	37%
Student	226	23%
Mechanical Engineer	103	11%
Educator	75	8%
General/Corporation Management	33	3%
Scientist	33	3%
Other Engineer	21	2%
Chemical Engineer	8	1%
Plant Operations	6	1%
Sales/Marketing/PR	4	0%
Reactor Operator	3	0%
Electrical Engineer	2	0%
Technician	2	0%
Manufacturer	1	0%
Health Physicist	0	0%
Chemist	0	0%
N/A	51	5%
Other	26	3%
Not Reported	14	1%
Total	971	100%

THD members by industry



THD members by industry

Continued on p. 3

### Message from the Chair, cont.

upward trajectory before the pandemic, has languished if not decreased since. The pandemic, has somewhat exposed what has been an issue for a while: given that we are a division heavily focused on developing high quality technical meetings, not been able to organize any for two years has really damaged our value proposition to our members.

Still, with crisis comes opportunity. These difficulties have lead the THD leadership to rethink our role and our approach to serving the community. For example, on October 1<sup>st</sup> we hosted our first ANS-wide webinar, which received 279 registrations and 158 attendees. It was a remarkable success, that received a lot of positive feedback and demonstrated the potential for this medium. We are already thinking about follow-up events, if you have any idea please reach out to me (e-mail below). Obviously we must do more than just a webinar series. Our communication strategy, long centered on our well established website [thd.ans.org](http://thd.ans.org) which remains an invaluable source of information, needs to be complemented by media that the new generations are consuming. To this end, we revamped our membership committee, now led by Dr. Matthew Zimmer, and tasked it to rethink our communication strategy and our value proposition to members, especially but not limited to: (a) members working in industry, (b) international members, (c) students and young members, (d) members in under-represented groups. The vice-chair Dr. Bao-Wen Yang and myself are also working on revising the strategic plan of the division to address these concerns. Given the positive outlook for thermal-hydraulics research and development there is no reason to have bold aspirations and goals for our membership.

And despite the pandemic being still ongoing in the United States, we are finally returning to in-person meetings. Following federal and state guidance, the Society plans on hosting its first in-person national meeting since 2019 at the [2021 ANS Winter Meeting and Technology Expo](#). A remote options remains available for those unable to travel to Washington DC. The THD technical program represents a robust and diverse collection of presentations, including our largest Young Professional thermal-hydraulics Research Competition to date! I would like to point three interesting panels: "High Performance Computing Applications in Thermal Hydraulics", "Advances in Design Through Advanced Reactor Development Program" and "Thermal Hydraulics Issues in Licensing of Advanced Reactors". This rich series of technical events I believe will continue to showcase our commitment to distribute the technical content of the utmost quality.

We continue to post relevant and upcoming information on our division's website and are providing all documentation relevant to our program and executive committee meetings there as well to ease access for all those that would like to participate. Our [Program Committee](#) and [Executive Committee](#) meetings for the Winter Meeting will take place on Sunday November 28, 2021 from 2:30-4:30 pm EDT and from 4:30-6:30 pm EDT, respectively. The meetings will be held virtually given that a lot of our membership will not be able to attend in person. The links are available on the THD website (<http://thd.ans.org/meetings/>) – everyone is welcome to join especially the program committee. Note that, If you are plan to attend the winter meeting in person, we will also host an in-person informal gathering at 4:30 pm on November 30<sup>th</sup>.

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## Message from the Chair, cont.

At this time the meeting room has not been assigned but the meeting is listed under Committee Meetings for that day. Everyone is welcome to participate.

In addition to the ANS National Conferences, we continue to support the organize our international topical meetings, such as NURETH-19, planned for March of 2022, ATH'22 scheduled for June 2022 and NUTHOS-13, planned for September 2022. NURETH-19 ([www.nureth19.com](http://www.nureth19.com)) is on schedule on March 6-11 2022 In Brussels, Belgium. The meeting will be offered with an hybrid approach and it will be the first topical meeting sponsored by THD since 2019! The meeting received an exceptional 720 full papers, the first round of reviews was completed in early October (each paper received at least two to three reviews). Overall the program is expected to be very strong, with an exceptional set of keynote lectures, special sessions and plenary speakers. We really hope you will be able to come and attend in person this unique and special conference. I had the privilege to attend an in-person conference recently and it was an exhilarating experience after so long. I trust NURETH-19 will be an incredible experience for all of those who attend. I really look forward at the intense conversations that are the hallmark of NURETH.

With the goal of ushering in a cohort of next-generation thermal-hydraulicists, we continue to grow our division-sponsored scholarship opportunities. For the first time, THD will offer two scholarship in the coming year: The Hochreiter scholarship and the Esposito scholarship. Additionally, we have recently established new division honors recognizing the recently passed Dr. Bal Raj Segal, which will be awarded for the first time at NURETH-19, and targets early and mid-career professionals. Please consider application nominees for the next cycle (2023). All package information can be found on the ANS honors and awards site (<https://www.ans.org/honors/>).

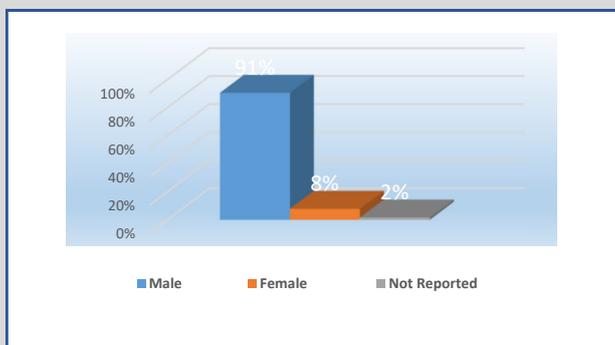
It is also my pleasure to announce to the larger community the selection, by the THD honors and award committee, of Prof. Francesco D'Auria and Dr. Chul-Hwa Song as recipients of the 2021 Technical achievement award. The TAA is the highest award the division bestows and the highest honor in the field of nuclear reactor thermal-hydraulics. I feel truly blessed that I have had the privilege to work with both these outstanding scientists, whose leadership and achievements are an example to us all. The TAA is given every year, and we encourage a broad range of submissions. We also have a newly established service award, meant to broaden our award program. Please consider submitting nominations for both awards for the next cycle (2022). For more information on the THD awards program please visit the recently revamped award section of the THD website: <http://thd.ans.org/awards/>.

On behalf of the executive committee members, I thank you all for your continued involvement and dedication toward the Division. Thank you for staying with us through two very turbulent years. Please reach to me directly if you want to contribute more directly to our activities or if you have new ideas for what THD should do. Now more than ever we need your help to propel us further ahead.

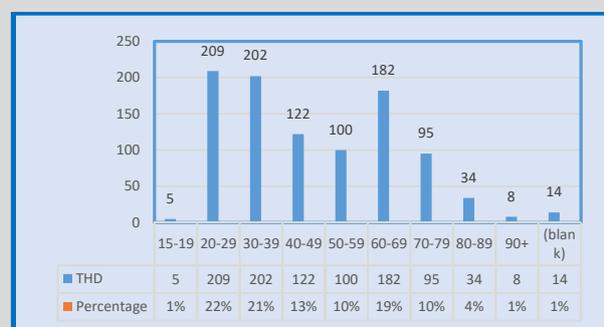
I hope to see you all at the ANS Winter Meeting in person or virtually.

Elia Merzari  
ANS 2021-2022 THD Chair  
[ebm5351@psu.edu](mailto:ebm5351@psu.edu)

## Membership Committee Report cont.



THD Members by Gender



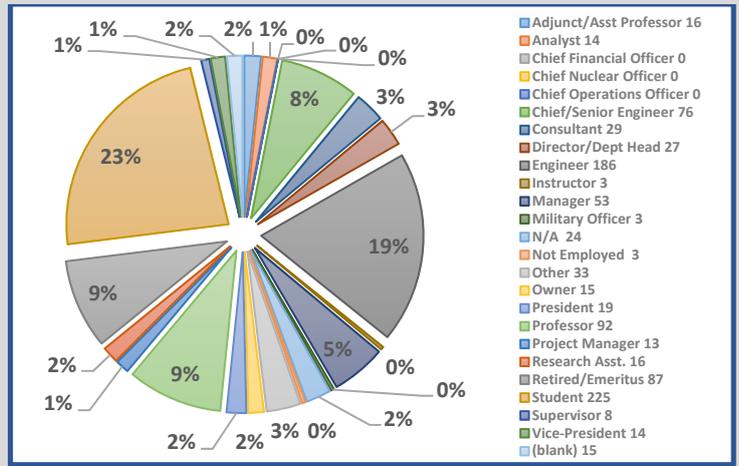
THD Members by Age

Continued on p. 4

Membership Committee Report cont.

Student	225	23%
Engineer	186	19%
Professor	92	9%
Retired/Emeritus	87	9%
Chief/Senior Engineer	76	8%
Manager	53	5%
Consultant	29	3%
Direct/Department Head	27	3%
President	19	2%
Adjunct/Assistant Professor	16	2%
Research Assistant	16	2%
Owner	15	2%
Analyst	14	1%
Vice-President	14	1%
Project Manager	13	1%
Supervisor	8	1%
Instructor	3	0%
Military Officer	3	0%
Chief Financial Officer	0	0%
Chief Nuclear Officer	0	0%
Chief Operations Officer	0	0%
Other	33	3%
N/A	24	2%
Not Reported	15	2%
Not Employed	3	0%
<b>Total</b>	<b>971</b>	<b>100%</b>

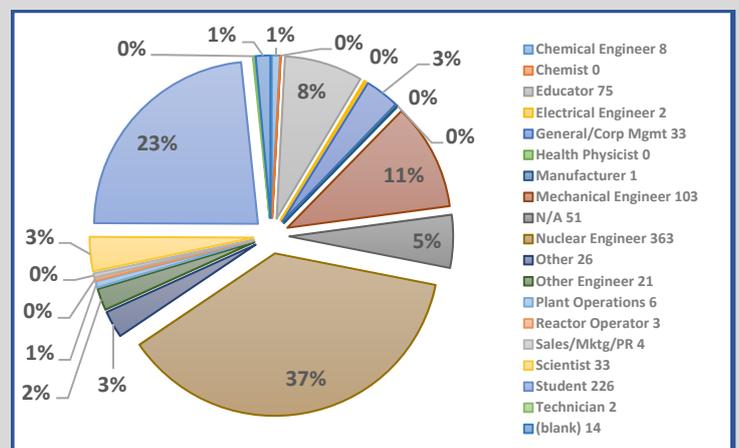
THD Members by Position



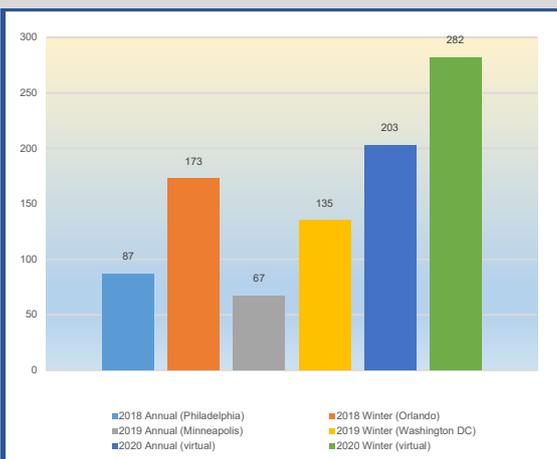
THD Members by Position

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Electrical Engineer	2	0%
Technician	2	0%
Manufacturer	1	0%
Health Physicist	0	0%
Chemist	0	0%
N/A	51	5%
Other	26	3%
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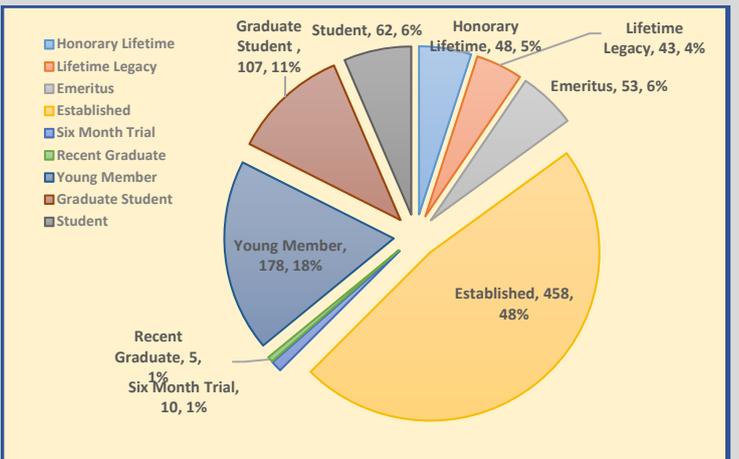
THD Members by Job Function



THD Members by Job Function



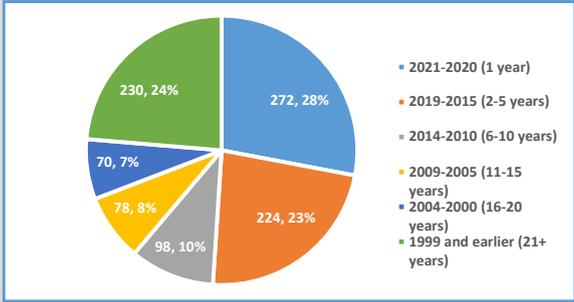
THD Members by National Meeting Attendance



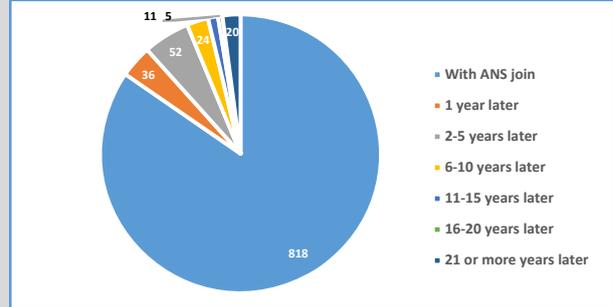
THD Members by Dues Package

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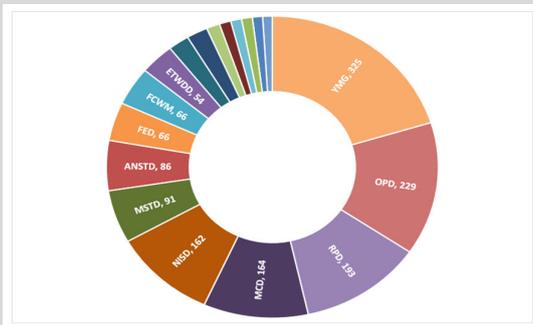
Membership Committee Report cont.



THD Members by When They Joined Division

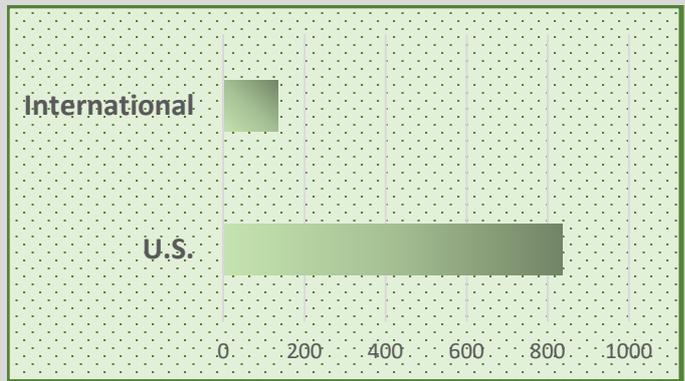


THD Members Division Join Date Compared to ANS Join Date



THD Members by Other Divisions

Smaller Amounts Not Shown Above: NCSD 33, HFICD 33, RPSD 21, IRD 18, DESD 17, RRSD 17, AAD 16 and NNPD 15



THD Members by U.S./International

State/Territory	Count	State/Territory	Count	State/Territory	Count
AE/AP	0	KY	0	OH	10
AK	0	LA	3	OK	1
AL	10	MA	25	OR	31
AR	2	MD	44	PA	72
AZ	8	ME	1	RI	1
CA	67	MI	16	SC	12
CO	4	MN	3	SD	0
CT	10	MO	12	TN	37
DC	3	MS	4	TX	47
DE	0	MT	0	UT	8
FL	17	NC	62	VA	63
GA	14	ND	0	VT	0
HI	2	NE	2	WA	28
IA	2	NH	4	WI	10
ID	59	NJ	6	WV	1
IL	63	NM	28	WY	0
IN	12	NV	2		
KS	5	NY	24		
<b>Total US</b>					<b>835</b>

THD Members by State/Territory

Country	Count	Country	Count
BELGIUM	4	JAPAN	16
BRAZIL	1	KOREA (REPUBLIC OF)	21
CANADA	14	LITHUANIA	1
CHINA	11	MEXICO	2
CROATIA	2	NETHERLANDS	2
CZECH REPUBLIC	2	PUERTO RICO	2
DENMARK	1	RUSSIA FEDERATION	1
FINLAND	1	SAUDI ARABIA	2
FRANCE	8	SPAIN	2
GERMANY	8	SWEDEN	4
GREECE	1	SWITZERLAND	3
HONG KONG	2	TAIWAN	5
INDIA	2	UNITED ARAB EMIRATES	3
INDONESIA	2	UNITED KINGDOM	2
ITALY	10		
<b>Total Foreign</b>			<b>135</b>

THD Members by Country

Wade Marcum  
THD Membership Committee Chair (2021-2022)

# Technical Program Committee Report

The strong THD presence at the ANS winter meetings continues during the global pandemic.

As the world begins to hopefully transition back to normal from COVID-19, the 2021 Winter meeting will be held in hybrid format. Despite that, THD has a very impressive program planned for the December event.

A total of 59 summaries were submitted, out of which, based on the reviewer recommendations, a total of 57 summaries are expected to be presented at this Winter Meeting. Again, let us take this opportunity to thank the session organizers and reviewers for their efforts: 162 reviews were completed for this Annual Meeting (on average, about 2.7 reviews per paper). All 17 sessions sponsored by THD are listed on the right, with one technical session (on the National Reactor Innovation Center Virtual Test Bed) and one panel (on the Advanced Reactor Demonstration Program) co-sponsored with RPD. The links to connect to each session will appear 30 minutes before the session start for registered conference participants.

In lieu of technical sessions at the upcoming summer meeting, THD will be organizing Advances in Thermal Hydraulics 2022 (ATH22) as an embedded topical meeting. The submission website for this meeting is now open and we expect to have a vibrant program, with full-length

## 2021 ANS Winter THD Technical Sessions

December 1-3, 2021

Session	# of papers	Time Slot (ET)
Experimental Thermal Hydraulics – I	5	Wednesday 12:30pm
General Thermal Hydraulics (Live)	3	Wednesday 2:35pm
Computational Thermal Hydraulics – I	4	
Computational Thermal Hydraulics – II	4	Wednesday 4:20pm
Young Professionals Thermal Hydraulics Research Competition – I	5	Thursday 10:00am
Young Professionals Thermal Hydraulics Research Competition – II	5	Thursday 1:00pm
Experimental Thermal Hydraulics – II	5	
NRIC Virtual Test Bed (Live, w/RPD)	5	
High Performance Computing Applications in Thermal Hydraulics (Live)	Panel	Thursday 3:05pm
Young Professionals Thermal Hydraulics Research Competition – III	4	Friday 8:00am
Advanced Reactor Thermal Hydraulics - I	4	
Advances in Design Through the ARDP (Live, w/RPD)	Panel	
Young Professionals Thermal Hydraulics Research Competition – IV (Live)	4	Friday 10:00am
Thermal Hydraulics Issues in Licensing of Advanced Reactors (Live)	Panel	
Computational Thermal Hydraulics – III	5	Friday 1:00pm
Advanced Reactor Thermal Hydraulics - II	4	
Computational Thermal Hydraulics – IV	5	Friday 3:05pm

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papers (14 pages max) in the following topics:

1. Fundamental TH
2. Code development and applications
3. Operating LWR TH and safety
4. Severe accidents, phenomena, modeling and experiments
5. TH of advanced reactors
6. TH of nuclear installations
7. Special sessions

Additionally, ATH will accept summary submissions (4 pages max) for

8. General TH
9. Young professional TH research competition

The full call for papers can be found [here](#) (see attached). The meeting will be held June 12 – 16 in Anaheim, CA. Papers are due January 3.

At the 2021 ANS Winter Meeting, the THD Program Committee meeting will be held online on Sunday Nov 28<sup>th</sup> from 2:30pm – 4:30pm (EST). It can be accessed [here](#) via Zoom. (Password: ANSTHD2021)

Finally, we would like to express our gratitude to all of our colleagues who devote their 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 paper summaries, volunteering to organize sessions, and supporting the peer-review of the papers.

Igor A. Bolotnov  
NC State University  
THD PC Chair

Dillon Shaver  
Argonne National Lab  
THD Vice PC Chair  
PCChair@thd-ans.org

## NUTHOS-13

September 5-9 2022  
Taichung, Taiwan

Please see the **Call For Paper (CFP)** and more information in the following pages!

## 19th International Topical Meeting on Nuclear Reactor Thermal Hydraulics (NURETH-19)

March 6-11 2022 • Brussels, Belgium

We look forward to hosting NURETH-19 as live event! We believe that personal interaction, both scientific and social, is a true added value for our community.

We are encouraged by the fact that, since July 1st 2021, COVID certificates are enabling easy travel within the European Union. Moreover, Europe is gradually relaxing restrictions for travelers with vaccination certificates from outside the EU. We will offer our non-EU attendees the possibility to shift to "virtual attendance" if it turns out they are unable to travel due to COVID restrictions. The organizing committee will contact all non-EU registrants for their final plans at 8 to 6 weeks before the start of the conference. Virtual attendance includes online access to live streaming of the plenary sessions and keynote speeches, and access to pre-recorded videos of the technical presentations.

The meeting promises to be informative and exciting! We have received 720 full articles. Review notifications have been sent to all authors. Information on pre-conference workshops, technical visits, plenary sessions and keynote speakers is added to the conference website every week.

Please note that submission for participation in the poster and movie competitions is still possible until November 30.

Registration is now open at: <http://www.nureth19.com>.

## NUTHOS-13

The 13th International Topical Meeting on Reactor Thermal-Hydraulics, Operation, and Safety (NUTHOS-13) will be held in Taichung, Taiwan on September 5-9, 2022, hosted by Chung-Hwa Nuclear Society (CHNS), National Tsing Hua University (NTHU) and co-hosted by American Nuclear Society (ANS), Atomic Energy Society of Japan (AESJ), Canadian Nuclear Society (CNS), Chinese Nuclear Society (CNS), Korean Nuclear Society (KNS).

The NUTHOS conference is traditionally held every two years. The first was held in Taipei in 1984 followed by Tokyo (1986), Seoul (1988), Taipei (1994), Beijing (1997), Nara (2004), Seoul (2008), Shanghai (2010), Kaohsiung (2012), Okinawa (2014), Gyeongju (2016) and Qingdao (2018). NUTHOS, focusing on nuclear thermal hydraulics, operation and safety, has attracted great attentions from the international nuclear community and has become one of the major international conferences in these fields.

The theme of NUTHOS-13 is “Advancing the Sustainable Development of Nuclear Energy” and covers eight technical tracks including Fundamental Thermal-Hydraulics, Computational Thermal-Hydraulics and CFD Method, Experimental Thermal-Hydraulics, Safety and Severe Accidents, Thermal-Hydraulics and Safety of Advanced Reactors, Plant Operation and Maintenance, Plant Diagnostics and Monitoring, Small Modular Reactors and Micro Reactors. Moreover, a special session on Decommission and Spent Fuel Management and a panel session on Small Modular Reactors and Micro Reactors are arranged. Attendees will be able to report on their studies and changes impacting the nuclear industry and share lessons learned from their safely operations of nuclear power plants.

Taiwan is well known as Formosa—the beautiful island—and a “butterfly kingdom”. With the favorable latitude and landscape rising from sea level to mountain tops of about 3000- 4000 m, Taiwan is home to more than 430 species of butterflies. Taichung is an industrial city, with a population about 3 million, on the western side of central Taiwan. It takes about half an hour via High Speed Rail from Taiyuan International Airport to Taichung. In the bustling city center are museums, temples, the ornate brick Taichung Station, and National Taichung Theater (an opera house) designed by Japanese architect Toyo Ito. It’s a gateway for exploring the island’s mountainous interior, including nature areas like Sun Moon Lake, popular for boating and hiking. One of the technical tour of the conferences is visiting a 2600 MWe pumping storage facility using Sun Moon Lake as the upper reservoir. A stop will be made at a butterfly valley on the way to the facility. Join us to watch the flapping of these colorful butterflies in beautiful Taiwan, brainstorm the development of nuclear power for the sustainable era, and create the butterfly effect that will benefit our society.

## Honors and Awards Committee Report

### 2021 THD Technical Achievement Award

The Honors and Awards Committee received outstanding nominations for the 2021 Thermal Hydraulics Division Technical Achievement Award (TAA). Two recipients were selected for the 2021 TAA and they are Professor Francesco D’Auria of the University of Pisa and Dr. Chul-Hwa Song of the Korea Atomic Energy Research Institute (KAERI).



Prof. F. D’Auria



Dr. C.-H. Song

Professor D’Auria, Professor of Nuclear Engineering at the University of Pisa, received this award “*For his exceptional contributions to the understanding of fundamental thermal-hydraulics phenomena in light water reactors and his pioneering contributions to the development of best estimate approaches that account for uncertainty.*” Dr. Song, Distinguished Tenured Researcher at KAERI, received this award “*For his outstanding contributions to the advancement of nuclear thermal-hydraulics and reactor safety through experiments and physical modeling of key phenomena in conventional and advanced light water reactors.*” The TAA is the highest award the THD bestows. The Honors and Awards Committee congratulates Prof. D’Auria and Dr. Song on receiving this distinguished award.

Professor D’Auria and Dr. Song will be recognized at the THD Award Ceremony (scheduled to immediately follow the General Thermal Hydraulics session on Wednesday afternoon December 1, 2021) at the upcoming 2021 ANS Winter Meeting. As a tradition, the two TAA recipients are invited to each deliver a TAA lecture at the International Embedded Topical Meeting on Advances in Thermal Hydraulics – 2022 (ATH’22) to be held in conjunction with the 2022 ANS Meeting from June 12-16, 2022, at the Anaheim Hilton, Anaheim, CA.

The THD Honors and Awards Committee encourages and welcomes nominations for the TAA. The next deadline for

[Continued on p. 10](#)



**NUTHOS-13**  
**2022** Taichung  
Taiwan

## CALL FOR PAPERS

September 5<sup>th</sup> to 10<sup>th</sup>

The Lin Hotel, Taichung, Taiwan

### Conference Theme

The major theme of the conference will be "Advancing Sustainable Development of Nuclear Power". The conference covers all the current thermal-hydraulic areas in nuclear research and development, as well as plant operational safety, maintenance, diagnostics and monitoring. Attendees will be able to report on challenges impacting the nuclear industry and share lessons learned from reviews, drills, and major exercises.

### Key Dates for Submission of Abstracts, Papers & Early Registration

**Abstracts:** Abstracts of papers (< 250 words) including title, authors and affiliations.

**Due date: November 30, 2021**

**Notification of abstract acceptance: January 5, 2022**

**Papers:** Draft papers maximum 12 pages in length including figures, tables and references.

**Draft papers due: February 15, 2022**

**Notification of Draft Paper Acceptance: March 30, 2022**

**Final papers due: May 30, 2022**

Submit abstracts and documents as Word files at

Website: <https://www.nuthos-13.org/>

Abstract & Paper templates available for download at the website.

**Early Registration deadline: May 30, 2022**

### Technical Tracks

- 1. Fundamental Thermal-Hydraulics**
  - 1.1 Liquid Metal Thermal-Hydraulics
  - 1.2 Two-Phase Flow
  - 1.3 Boiling and Condensation Thermal-Hydraulics
  - 1.4 Turbulence Modeling
  - 1.5 Other Fundamental Issues
- 2. Computational Thermal-Hydraulics and CFD Method**
  - 2.1 Advances in Numerical Methods
  - 2.2 Code Development and V&V
  - 2.3 CFD Application to Nuclear Engineering
  - 2.4 Multi-Scale and Multi Physics Coupling Simulation
- 3. Experimental Thermal-Hydraulics**
  - 3.1 Fundamental Phenomena
  - 3.2 Advanced Measurement Techniques
  - 3.3 Separate Effects Experiments
  - 3.4 Integral Effect Experiments
- 4. Safety and Severe Accidents**
  - 4.1 Design Base Accidents
  - 4.2 Analysis, Mitigation and Management
  - 4.3 In-Vessel Related Phenomena
  - 4.4 Ex-Vessel Related Phenomena
  - 4.5 Containment Thermal-Hydraulics and Source Term
  - 4.6 Safety Culture
- 5. Thermal-Hydraulics and Safety of Advanced Reactors**
  - 5.1 Water Cooled Reactors
  - 5.2 Liquid Metal Cooled Reactors
  - 5.3 Gas Cooled Reactors
  - 5.4 Molten Salt Reactors
  - 5.5 Research Reactors
- 6. Plant Operation and Maintenance**
  - 6.1 Plant Transients Behavior and System Improvement
  - 6.2 Operation, I&C and Inspection
  - 6.3 Risk Informed and Performance Based Regulation
  - 6.4 Application of Artificial Intelligence and Related Challenges
  - 6.5 Plant Licensing Renewal and Life Extension
- 7. Plant Diagnostics and Monitoring**
  - 7.1 Plant Simulators, Analyzers and Operator Training
  - 7.2 PRA Application to Design, Operation and Maintenance
  - 7.3 Components Diagnostics and Maintenance
  - 7.4 Fuel Management, Waste management and Radiation Protection on Site
  - 7.5 Environmental Nuclear Safety
- 8. Small Modular Reactors and Micro Reactors**
  - 8.1 Design Innovation
  - 8.2 Economic Perspective
  - 8.3 Thermal Hydraulic, Safety, and Operation
  - 8.4 Compromise with Renewable Energy
- 9. Special Sessions**
  - Decommission and Spent Fuel Management
- 10. Panel Sessions and Key Note Lectures**
  - Panel Session on SMR and Key Note lectures

### Conference Organizing Committee

#### Honorary Chairs

Prof. John C. Luxat (McMaster, Canada)  
Prof. Hisashi Ninokata (POLIMI, Italy & Japan)  
Prof. Jong Hyun Kim (KAIST, Korea)

#### General Chair

Prof. Min Lee (NTHU, Taiwan)

#### General Co-Chairs

Prof. Fan Bill Cheung (Penn State U, USA)  
Prof. Yassin A. Hassan (TAMU, USA)  
Prof. Bao-Wen Yang (DEQD, China)

#### International Steering Committee Chair

Dr. Jason Chao (United Nuclear Inc, USA)

#### Technical Program Committee Chair

Prof. Chin Pan (City U, Hong Kong)

#### Technical Program Committee Co-Chairs

Prof. Xu Cheng (KIT, Germany)  
Dr. Lin-Wen Hu (MIT, USA)  
Prof. Elia Merzari (Penn State U, USA)  
Prof. Chul-Hwa Song (KAERI, Korea)  
Prof. Yuliang Sun (Tsinghua U, China)  
Prof. Satoshi Yanagihara (ANDES, Japan)

#### Technical Program Committee Secretary

Dr. Jin Der Lee (NTHU, Taiwan)

#### Local Organization Committee Chair

Prof. Yuh-Ming Ferng (NTHU, Taiwan)

#### Local Organization Committee Co-Chair

Dr. Yung Shin Tseng (NTHU, Taiwan)

[www.nuthos-13.org](http://www.nuthos-13.org)

Hosts:



Co-Hosts:



# THD CSC Report

Upon approval by the THD Executive Committee (EC) to hold NURETH-20 in 2023, the THD Conference Screening Committee (CSC) posted an official announcement in early May 2021 via the THD Website to solicit proposals for NURETH-20 with the deadline for proposal submission being July 15, 2021. By July 17, 2021 that was two days after the deadline, the CSC received only one proposal submitted by the DC Section which proposed to host NURETH-20 in Washington, DC in August 2023.

The CSC carefully reviewed the DC proposal and, having gone through many rounds of discussions, a Summary of the CSC's evaluation was prepared and submitted on July 30, 2021 to the EC of THD for approval. In brief, the CSC recommended that the NURETH-20 proposal submitted by the DC section be approved by the THD Executive Committee. The CSC found that the proposed site location is well known and reliable and the proposed agenda is consistent with previous NURETHs. The conference theme is of current appeal as it brings a positive and challenging mood. The DC section has a history of hosting great conferences and from that standpoint, a well-run conference can be expected. The organizational team is very strong.

However, it is largely US-based and should be strengthened by including leadership team from the non-US regions (mainly Europe and Asia). Especially in the hard Covid times in which we are living now, this may be crucial for the success of the conference.

The CSC recognized that there was much less time available (compared to previous years) for the host organization to prepare the subject proposal owing to the late announcement caused by the pandemic. As such, the CSC appreciated and highly commended the dedicated effort of the host organization for their timely response to the call for proposals in such a short notice.

The DC proposal has since been unanimously approved by the EC of THD.

F. B. Cheung  
September 20, 2021

Xiaodong Sun  
2021-2024 THD Honors and Award Committee Chair  
xdsun@umich.edu  
Kurshad Muftuoglu  
2021-2022 THD Honors and Award Committee Vice Chair  
kurshad.muftuoglu@ge.com

## Honors and Awards Committee Report, cont.

nomination submission is August 1, 2022. The details including the award form can be found at <http://thd.ans.org/awards/technical-achievement-award/> and <https://www.ans.org/honors/award-techachieve/>.

### 2021 Bal-Raj Sehgal Memorial Award

The newly established Bal-Raj Sehgal Memorial Award by the THD in 2020 recognizes an early-career to a mid-career individual for his/her exceptional and/or sustained contributions to the thermal-hydraulics field with a particular focus on the application of thermal-hydraulics to nuclear reactor safety. The Honors and Awards Committee received excellent nominations for the 2021 Bal-Raj Sehgal Memorial Award. Dr. Elia Merzari, Associate Professor of the Pennsylvania State University was selected for the award "*in recognition of his outstanding contributions to the simulation of complex turbulent flow phenomena in nuclear reactors which help enhance the safety and efficiency of advanced reactor designs and for his tireless support of ANS technical committees and conferences.*"

Please refer to the photo of Prof. Merzari from his Chair message page in the cover page of this Newsletter.

Professor Merzari will be recognized at the upcoming NURETH-19 to be held in March 2022 in Brussels, Belgium, with a keynote lecture to be delivered at the same conference. Please join us to congratulate our inaugural Bal-Raj Sehgal Memorial Award recipient! The Honors and Awards Committee wishes to acknowledge the Sehgal family for the generosity of establishing this award.

In addition to the TAA and Bal-Raj Sehgal Memorial Award, the THD Honors and Awards Committee plans to make the 2021 Best Paper Award selection from the NURETH-19 accepted papers. Furthermore, THD recently re-established a service award, the THD Meritorious Service Award, to recognize an individual for sustained and exemplary service to the nuclear thermal-hydraulic profession. The next deadline for the service award nomination submission is March 1, 2022 (<http://thd.ans.org/awards/meritorius-service-award/>). These award selections will be reported in the THD 2022 Spring Newsletter.

Finally, we would like to take this opportunity to thank the THD Honors and Award Committee members and all the nominators for their dedicated work! Congratulations to all our 2021 honorees!

# Nominating Committee Report

The THD Nominating Committee (NC) comprises the current Division Chair, Vice Chair, Program Committee (PC) Chair, and the Immediate Past Division Chair, and is chaired by the Immediate Past Division Chair. The goal of this committee is to nominate members for Division committees, including Division officers. The Division NC for the 2021-2022 ANS business year is composed of Wade Marcum (Chair), Elia Merzari, Bao-Wen Yang, and Igor Bolotnov (Ex-officio)

## Executive Committee

### Current EC Representation (Effective June 2021 through June 2022)

#### Division Officers

- Division Chair: Elia Merzari (PSU)
- Vice Chair/Chair-Elect: Bao-Wen Yang (Delta Energy Group)
- Secretary: Annalisa Manera (UMich)
- Treasurer: Igor Bolotnov (NCSU)

#### Division Appointment

- Webmaster: Marilyn Delgado

#### Division Members

- Term Expires June 2022: Fatih Aydogan (Jacksonville U.), Igor Bolotnov (NCSU), Lane Carasik (VCU), Yassin Hassan (TAMU), Robert Martin (BWXT)
- Term Expires June 2023: Yang Liu (VT), John Luxat (McMaster U.), Hisashi Ninokata (POLIMI), Piyush Sabharwall (INL), Caleb Brooks (UIUC)
- Term Expires June 2024: X. Sun (UMich), Dillon Shaver (ANL), W. David Pointer (ORNL), Hyoung Cho (SNU), M. Moussaoui (OSU)

#### Honors and Awards Committee

- Chair: Xiaodong Sun (UMich) [2021-2024]
- Vice-Chair: Kurshad Muftuoglu (GEH) [2021-2022]
- Members (past chairs): W. David Pointer (ORNL), Chul-Hwa Song (KAERI), Wade Marcum (OSU)
- Members (at large): Yassin Hassan (TAMU), Hisashi Ninokata (POLIMI) [2021-2024]

#### Conference Screening Committee

- Chair: Fan-Bill Cheung (PSU) [2021-2025]
- Term Expires June 2022: Xu Cheng (KIT), Wade R. Marcum (OSU)
- Term Expires June 2023: Hisashi Ninokata (POLIMI), Ferry Roelf (NRG)
- Term Expires June 2024: Francesco D'Auria (UNIP), Jong H. Kim (KAIST)
- Term Expires June 2025: Dominique Bestion (CEA, Retired), Fan-Bill Cheung (PSU), Robert P. Martin (BWXT)

#### Scholarship Committee

- Chair: W. David Pointer (ORNL) [2021-2024]
- Term Expires June 2022: Piyush Sabharwall (INL), Dillon Shaver (ANL)
- Term Expires June 2023: Seungjin Kim (Purdue), Kurshad Muftuoglu (GEH)
- Term Expires June 2024: Xu Cheng (KIT), Fan-Bill Cheung (PSU), W. David Pointer (ORNL)

#### Nominating Committee

- Chair: Wade Marcum (OSU) [2021-2022]
- Members: Elia Merzari (PSU), Bao-Wen Yang (Delta Energy Group), Igor Bolotnov (NCSU) (Ex-officio)

#### Membership Committee

- Chair: Wade Marcum (ORNL) [2021-2022]
- Members: Bao-Wen Yang (Delta Energy Group), and Annalisa Manera (UMich), Igor Bolotnov (NCSU)

[Continued on p. 12](#)

## Nominating Committee Report, cont.

### Proposed EC Representation (Effective June 2022 through June 2023)

#### Division Officers

- Division Chair: Bao-Wen Yang (Delta Energy Group)
- Vice Chair/Chair-Elect: Annalisa Manera (UMich)
- Secretary: Igor Bolotnov (NCSU)
- Treasurer: Steve Bajorek (NRC)

#### Division Appointment

- Webmaster: Trevor Howard (OSU) [2021-2024]

#### Division Members

- Term Expires June 2023: Yang Liu (VT), John Luxat (McMaster U.), Hisashi Ninokata (POLIMI), Piyush Sabharwall (INL), Caleb Brooks (UIUC)
- Term Expires June 2024: X. Sun (UMich), Dillon Shaver (ANL), W. David Pointer (ORNL), Hyoung Cho (SNU), M. Moussaoui (OSU)
- Term Expires June 2025: Yassin Hassan (TAMU), Maria Avramova (NCSU), Jun Liao (Westinghouse), Bob Martin (BWXT), Marilyn Delgado (BWXT)

#### Honors and Awards Committee

- Chair: Xiaodong Sun (UMich) [2021-2024]
- Members (past chairs): Chul-Hwa Song (KAERI), Wade Marcum (OSU), Elia Merzari (PSU)
- Members (at large): Yassin Hassan (TAMU), Hisashi Ninokata (POLIMI) [2021-2024]

#### Conference Screening Committee

- Chair: Fan-Bill Cheung (PSU) [2021-2025]
- Term Expires June 2023: Hisashi Ninokata (POLIMI), Ferry Roelf (NRG)
- Term Expires June 2024: Francesco D'Auria (UNIP), Jong H. Kim (KAIST)
- Term Expires June 2025: Dominique Bestion (CEA, Retired), Fan-Bill Cheung (PSU), Robert P. Martin (BWXT)
- Term Expires June 2026: Bao-Wen Yang (Delta Energy Group), Wade Marcum (OSU)

#### Scholarship Committee

- Chair: W. David Pointer (ORNL) [2021-2024]
- Term Expires June 2023: Seungjin Kim (Purdue), Kurshad Muftuoglu (GEH)
- Term Expires June 2024: Xu Cheng (KIT), Fan-Bill Cheung (PSU), W. David Pointer (ORNL)
- Term Expires June 2025: Donna Guillen (INL), Marilyn Delgado (BWXT)

#### Nominating Committee

- Chair: Elia Merzari [2022-2023]
- Members: Bao-Wen Yang (Delta Energy Group), Annalisa Manera (UMich), Dillon Shaver (ANL) (Ex-officio)

#### Membership Committee

- Chair: Matt Zimmer [2021-2024]
- Members: Annalisa Manera (UMich), Igor Bolotnov (NCSU), Steve Bajorek (NRC)

## Scholarship Committee Report

The American Nuclear Society Thermal Hydraulics Division awards two annual graduate student scholarships: the Lawrence E. Hochreiter Graduate Scholarship and the Vincent J. Esposito Graduate Scholarship.

The **Lawrence E. Hochreiter Scholarship** was established by the ANS THD in 2019 and first awarded for the 2020-2021 academic year. The scholarship honors Dr. Lawrence E. Hochreiter, pioneer in nuclear thermal hydraulics modeling and nuclear safety analysis at Westinghouse Electric Company and the Pennsylvania State University, who was an active

[Continued on p. 13](#)

## Scholar Committee Report, cont.

member of the Thermal Hydraulics Division. The scholarship is awarded to a graduate student in nuclear science and engineering who is studying topics related to nuclear thermal hydraulics.

Lawrence E. Hochreiter Graduate Scholarship Recipients

2021 Adam Kraus

2020 Ishak Johnson

The **Vincent J. Esposito Scholarship** was established by the ANS THD in 2020, with the generous support of the Esposito family, and will be first awarded for the 2022-2023 academic year. The scholarship honors the ongoing contributions of Dr. Vincent J. Esposito, who is an Adjunct Professor at the University of Pittsburgh, former Vice President of the Nuclear Fuel Business Unit of Westinghouse Electric Company, and the 2013 American Nuclear Society Glenn T. Seaborg Congressional Fellow. The scholarship is awarded to a first-year graduate student in nuclear science and engineering who is studying topics related to nuclear thermal hydraulics

Important Dates

November 1, 2021 ANS Scholarship Program Announced

November 15, 2021 ANS Scholarship Applications Open

February 1, 2022 ANS Scholarship Application Deadline

W. David Pointer

## ANS Winter Meeting Is Going Full Hybrid Nov. 30-Dec. 3, 2021, Washington, D.C.)

### Things you need to know :

- Two weeks before the meeting, all session chairs will send a list of paper/panel presenters indicating who is in-person and who will present virtually
- At least one chair will be present in person in the meeting room
- There can be no more than four (4) in-person panelists
- There can be no more than four (4) virtual panelists – the virtual frame cannot accommodate more than four (4) panelists
- The panel moderator is counted as a panelist if they are virtual
- There can only be more than four (4) panelists including the moderator when some of the panelists are in person at the meeting

## Webmaster Report

Ahead of the fourth ANS National Virtual Meeting coming up this November, the THD website has seen a great amount of changes due to the larger footprint by attendees for the national meetings. While we hope to see a transition back to in-person meetings, virtual meetings seem to be here to stay as seen by this upcoming winter meeting. Therefore, the importance of the website to communicate meeting information and relay documents for all members, remains. The TH Division has not only one of the largest divisions, but also one with the most opportunity for scholarships and accolades. As my term as webmaster comes to an end, I would like to thank the division for allowing me to input my (at times last minute) creative and technical skills into the development of the website and hope that it helped during these past few years. I welcome Dr. Trevor Howard from Oregon State University who will serve as the new webmaster and offer my support.

Marilyn Delgado

- Two weeks before the meeting, all paper presenters and panelists will notify the session chair if they plan to be on-site or plan to present virtually
- **Virtual panelists provide their presentation to the session chair and/or upload it to the ANS platform no later than November 23, 2021**
- **Two weeks before the meeting, all paper presenters will notify the session chairs if they plan to be on-site or plan to present virtually**
- All session chairs (in-person), and all virtual presenters and panelists are encouraged to attend zoom training
- A schedule of group training sessions will be emailed and available on the meeting platform by November 5
- Training sessions are drop-in, no appointment necessary
- If you are unable to attend any of the scheduled training sessions, we will work to accommodate your schedule. Please contact [ecullen@ans.org](mailto:ecullen@ans.org)

## Strategic/Succession Plans

The THD leadership is revising the strategic plan, which will be discussed at the next EC meeting. If you have ideas or would like to contribute, please contact Dr. Elia Merzari OR Dr. Bao-Wen Yang.

# Financial Report

The budget for 2022 has been proposed and approved by the THD EC as follows:

Table 1 shows for all three award funds, 1. The TAA+Service award account started at a fund level of \$42,064, with incomes from investment gain (\$6,495) and division designated fund transfer (\$29,192 transferred from the general account). Total value is \$77,751 at the beginning of 2021. Note 1 TAA award of \$2,000 in 2020 and 2 proposed TAA awards of \$2000 each in 2021. Including good projected investment gain of 9% the account is in good shape going into 2022 (\$78,318 projected starting balance).

Table 1: ANS THD Awards Funds

	Hochreiter:	TAA/Service:	Esposito:	Sehgal:
Balance Forward from 12/31/2019	\$ 75,739	\$ 42,064		
Investment gain (up to 12/31/2020)	\$ 11,694	\$ 6,495		
Division Designated (2020)		\$ 29,192	\$ 75,000	\$ 23,000
<b>Total Income:</b>	\$ 87,433	\$ 77,751	\$ 75,000	\$ 23,000
<b>Budget Expenses:</b>				
Awards	\$ (3,000)	\$ (2,000)	\$ -	\$ -
Plaques	\$ -	\$ (102)	\$ -	\$ -
Other expenses:				
<b>Net:</b>	\$ 84,433	\$ 75,649	\$ 75,000	\$ 23,000
<b>Spending Limit (9.08%)</b>	\$ 7,666	\$ 6,869	\$ 6,810	\$ 2,088
<b>Projected expenses (2021):</b>	\$ -	\$ (4,200)	\$ -	\$ (2,100)
Total Year End funds (Projected, 12/31/2021)	\$ 92,099	\$ 78,318	\$ 81,810	\$ 22,988

	2020 Actual	2021 Budget	2021 Actual through 6/30/2021	2022 Proposed
<b>Balance Forward from Previous Year</b>	\$72,984	\$44,270	\$44,270	\$42,925
<b>Budget Funds</b>				
Member Dues Allocation (\$2/ full dues member; \$1 / reduced dues member)	\$1,639	\$2,300	\$802	\$1,604
Division Income				
<b>Total Income</b>	\$1,639	\$2,300	\$802	\$1,604
<b>Budget Expenses</b>				
Newsletters, Website				
Awards & Plaques	\$661	\$645	\$640	\$1,250
National Meeting Costs				
Topical Meeting Costs				
Division Officer Expenses				
Student Support		\$2,500	\$500	\$2,500
Future Activity				
Scholarship/NEED Funding	\$29,692	\$500		\$500
YMG Support				
Other Expenses				
<b>Total Expenses</b>	\$30,353	\$3,645	\$1,140	\$4,250
<b>Net</b>	(\$28,714)	(\$1,345)	(\$338)	(\$2,646)
<b>Total Year End Funds</b>	\$44,270	\$42,925	\$43,932	\$40,279

2. With the investment gain of \$11,694, the Lawrence Hochreiter scholarship account reaches a new balance of \$84,433, not including the investment gain/loss in 2021. This accounts for \$3000 scholarship award in 2020 to Ishak Johnson. Projected balance with 2021 investment gain is \$92,099.
3. The newly established Bal-Raj Sehgal Memorial Award has been funded by the family at \$23,000. The projected gain of \$2,088 nearly equal the planned award of \$2,000 in March 2022 (postponed NURETH-19 conference). This award will be given every other year.
4. Esposito award has been funded at \$75,000 and is expected to get \$6,810 investment gain by the end of the year.
5. The general account is at nearly \$44,000 at the end of this year, and the total expected value of the award accounts is about \$275,000.

Igor A. Bolotnov  
THD Treasurer (2021-2022)



June 2021  
ANS Thermal Hydraulics  
Division Newsletter  
(Issue No. 35)

Bao-Wen Yang, Editor  
THD Vice Chair (2021-2022)  
<http://thd.ans.org>



**American Nuclear Society**  
Thermal Hydraulics Division



# International Topical Meeting on Advances in Thermal Hydraulics 2022 (ATH'22) EMBEDDED IN THE 2022 ANS ANNUAL MEETING

June 12-16, 2022 | Anaheim, California, USA | Anaheim Hilton Hotel

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## CALL FOR PAPERS

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### EXECUTIVE CHAIRS

#### **General Chairs**

Chul-Hwa Song (KAERI)  
Xiaodong Sun (Univ. of Michigan)

#### **Technical Program Chairs**

W. David Pointer (ORNL)  
Dirk Lucas (Helmholtz-Zentrum Dresden-Rossendorf)

#### **Assistant Technical Program Chairs**

Dillon Shaver (ANL)  
Xiaojing Liu (Shanghai Jiao Tong Univ.)

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## IMPORTANT DUE DATES

<b>JANUARY</b>			FULL PAPERS AND SUMMARIES DUE: <b>January 3, 2022</b>
<b>FEBRUARY</b>			AUTHOR NOTIFICATION: <b>February 15, 2022</b>
<b>MARCH</b>			FINAL FULL PAPERS AND SUMMARIES DUE: <b>March 15, 2022</b>

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## ABOUT THE MEETING

Papers are solicited for the **International Topical Meeting on Advances in Thermal Hydraulics 2022 (ATH'22)**, to be held as an embedded topical meeting at the **2022 ANS Annual Meeting on June 12-16, 2022 at the Anaheim Hilton, Anaheim, CA**. Organized by the American Nuclear Society Thermal Hydraulics Division, this embedded topical meeting is the sixth in a growing series featuring peer-reviewed, full-length technical papers covering recent advances in thermal hydraulics. Authors and presenters are cordially invited to participate in this event to exchange ideas and knowledge, develop strong relationships across organizations, and establish collaborations to solve challenging problems.

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Paper acceptance will be based upon originality of the work, strictly implemented methods or models, quality of results, impact of the scientific advances to the field of thermal hydraulics, conclusions supported by data, proper citation of references, and use of correct grammar and spelling. Full papers must use the meeting template and formatting, which can be found at [ans.org/meetings/view-312/](https://ans.org/meetings/view-312/). Summaries must use the ANS template and formatting, which can be found at [ans.org/pubs/transactions/](https://ans.org/pubs/transactions/). Papers will incur a publication fee of \$25 per page.

**Selected papers will be published in a special edition of *Nuclear Technology*.**

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**SUBMIT A SUMMARY OR PAPER**  
<https://epsr.ans.org/meeting/?m=338>

**PROGRAM SPECIALIST**  
Janet Davis  
708-579-8253  
[jdavis@ans.org](mailto:jdavis@ans.org)



# International Topical Meeting on Advances in Thermal Hydraulics 2022 (ATH'22) EMBEDDED IN THE 2022 ANS ANNUAL MEETING

June 12-16, 2022 | Anaheim, California, USA | Anaheim Hilton Hotel

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## SUBJECT AREAS

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High-quality full-length papers (14-page maximum) are solicited on the following topics:

1. **FUNDAMENTAL THERMAL-HYDRAULICS**
  - a. Boiling and Condensation Phenomena
  - b. Experimental Methods and Instrumentation
  - c. Fluid-Structures and Materials Interaction
  - d. Heat Transfer Enhancement Phenomena
  - e. Micro-Channel Flow and Heat Transfer Phenomena
  - f. Rod Bundle Flow and Heat Transfer Phenomena
  - g. Two-Phase Flow and Heat Transfer Fundamentals
2. **CODE DEVELOPMENT AND APPLICATIONS**
  - a. Applications of Computational Methods to Nuclear Systems
  - b. Computational Fluid Dynamics Methods
  - c. Multiphysics-Coupled Thermal-Hydraulic Analysis Methods
  - d. Multiscale Methods
  - e. Novel System Code Development
  - f. Subchannel Analysis Methods
  - g. System Thermal Hydraulics Methods
  - h. Verification & Validation Methods for Thermal Hydraulics Analyses
3. **OPERATING LWRs THERMAL HYDRAULICS AND SAFETY**
  - a. Best Estimate LOCA and BEPU Analysis
  - b. Nuclear Reactor Plant Thermal Hydraulics and Safety
  - c. Operating LWRs Thermal Hydraulics and Safety
  - d. Thermal Hydraulics in Power Upgrading/Life Extension
4. **SEVERE ACCIDENTS, PHENOMENA, MODELING AND EXPERIMENTS**
  - a. Combustion and Fires, Modeling and Experiments
  - b. Thermal Hydraulics in Accident Management
  - c. Thermal Hydraulics of Severe Accidents — Fundamentals
5. **THERMAL HYDRAULICS OF ADVANCED REACTORS**
  - a. Gas-Cooled Reactor Thermal Hydraulics
  - b. Microreactor Thermal Hydraulics
  - c. Molten-Salt Reactor Thermal Hydraulics
  - d. Next Generation LWR Thermal Hydraulics
  - e. Small Modular Reactor Thermal Hydraulics
  - f. Sodium-Cooled Fast Reactor Thermal Hydraulics
6. **THERMAL HYDRAULICS OF NUCLEAR INSTALLATIONS**
  - a. TH of Nuclear Reactors Coupled with Energy Storage
  - b. TH of Nuclear Hydrogen Production Systems
  - c. TH of Used Fuel Management Systems
  - d. TH of Nuclear-Renewable Coupled Energy Systems
7. **SPECIAL SESSIONS**
  - a. Advances in High-Fidelity Measurements and Data Analysis
  - b. Advanced Heat Exchanger Design
  - c. Artificial Intelligence for Nuclear System and Thermal-Hydraulics Modeling
  - d. Direct Numerical Simulations as High-Fidelity Data for Model Development
  - e. High Performance Computing Applications in Nuclear Engineering
  - f. Interface-Resolved Two-Phase Flow Simulation
  - g. Multiphase Multiscale Modelling and Simulation
  - h. NEAMS TH IRP: Thermal-Fluids Applications in Nuclear Energy
  - i. Reliability of Passively Operating Systems
  - j. Thermal Hydraulic Optimization for Additively Manufactured Components

In addition to full papers, we will also accept summary submissions (4-pages maximum) for the following two topics:

### 8. GENERAL THERMAL HYDRAULICS

### 9. YOUNG PROFESSIONAL THERMAL-HYDRAULIC RESEARCH COMPETITION