THERMAL HYDRAULICS DIVISION NEWSLETTER

Spring 2008

Message from the Chair

Dear Colleagues:

During the November 2007 ANS meeting I presented the status of our division to the ANS Board of Directors. I am glad to report to you that overall, our division has been doing great. Thanks to my predecessors, colleagues in the executive and program committees, highly dedicated members and supporters, the division has been successful in all its vitality measures. I would like to summarize some of the key aspects of the division status in this newsletter.

Our division membership has grown steadily over the past several years with current membership of 962 which is about 9% of the total ANS membership. The student membership has also grown in the past few years, and the current student membership is 147. We would like to focus on this important constituency for our future membership growth. Our current budget shows healthy numbers. We have established a five year spending plan that includes generous support for student scholarships and travel for meetings. Last year, our division contributed $4000 towards student conferences, travel and scholarships.

Our division has established a five year operational plan (2005-2009), a yearly tactical plan, a five year strategic plan (2005-2009) and yearly succession plan. Our division members regularly participate with other professional societies such as ASME and AIChE. Our members have strong representation in national and topical meetings with high quality technical papers. In the past several years our division members have presented more than 30 papers with 5 or more sessions each in every ANS winter and fall meetings. NURETH, NUTHOS and various embedded topical meetings have been sponsored by our division. Our division has hosted several Young Member Competition sessions at national meeting and sponsored several professional development workshops that are useful to the nuclear community and nuclear industry. The division members regularly publish post-meeting papers in Journals such as Nuclear Technology, Nuclear Engineering and Design and Nuclear Engineering and Technology.

Given these successes, our division looks ahead for brighter future. As with any healthy division, we plan to focus our future efforts on the following areas:

- Student and Young Member participation
- Collaboration with other Divisions
- International members in the program committee
- Industry participation in THD
- More professional development programs
- Endowment for the TAA and other awards to recognize peers and leaders in the THD area
- High quality research presentations

Coming June 2008, we have another exciting ANS meeting in Anaheim CA. Our division has sponsored 6 contributed paper sessions with 29 papers and one panel session at this annual summer meeting. The panel session is on Thermal Hydraulics Aspects of Nuclear Hydrogen Systems. The next generation nuclear plant (NGNP), a very high temperature gas-cooled reactor (VHTR) is being developed to serve as a demonstration of state-of-the-art nuclear technology. The purpose of the demonstration is twofold: (1) efficient low-cost energy generation and (2) hydrogen production. While hydrogen production and advanced energy cycles are still in their early stages of development, research toward hydrogen production using nuclear process heat is under way. What this particular panel session would focus on would be the thermal hydraulics aspects of system integration, efficiency, advantages and disadvantages of the high temperature steam electrolysis, S-I process, and hybrid sulfur and other process. This panel has leading researchers in the nuclear hydrogen production field, and the current status of the technology will be discussed. While the focus would be on thermal hydraulics issues, questions on materials, control, and safety will also be discussed since these also limit the hydrogen production.

I would also like to note that we have dedicated a session, General Thermal Hydraulics, in memory of Professor Gunol Kojasoy of University of Wisconsin, Milwaukee, who passed away on January 12, 2008, at the age of 67. Until his recent retirement in 2006, he had been an active member of the Mechanical Engineering Department at the University of Wisconsin-Milwaukee for 26 years, and served as the Department Chair from 1994-1999, as well as 2003-2004. Prof. Kojasoy received his B.S. degree in Mechanical Engineering from Istanbul Technical University, Turkey in 1964 and M.S. degree in 1967 from New York University. He earned his Ph.D. degree in Mechanical Engineering from Georgia Institute of Technology in 1971. He received several awards for his excellent teaching including the 1994 ASME Design Education Curriculum Innovation Award and the 2002 UWM Distinguished Teaching Award. Prof. Kojasoy was an internationally recognized authority in the area multi-phase

flow systems as well as heat transfer, in which he also excelled as a teacher. I had the opportunity to work as consultant for Professor Kojasoy on conductivity probes. The first time that I visited Milwaukee, he invited me for a dinner at his house; he and his wife Mrs. Gunol Kojasoy were very gracious and excellent hosts. Professor Kojasoy was loved, respected, and admired by his many students and friends and his passing is a great loss to all of us.

In my last message as THD Chair, I also want to address the impact that our division can and will make in relation to the impending rapid growth of the nuclear power sector. The existing reactors are performing very well in terms of capacity factors. Over the past two decades, nuclear power plants have achieved increasingly higher capacity factors with the same or greater levels of safety. The average capacity factor for U.S. plants in operation in 1980 was 56.3 percent; in 1990, 66 percent; and in 2007, 91.8 percent.

The re-licensing and power uprate activates are continuing at a fast pace. So far, 48 reactors have 20-year license extensions, and 15 reactors have filed for license renewal and another 21 plants are expected to apply for license renewal. Almost all U.S. nuclear have undergone power uprates between 1977 and 2008. Some of them have raised their power up by 20%.

Currently, 17 companies or groups of companies are preparing license applications for over 30 new reactors. In 2007, five complete or partial applications for combined construction and operating licenses (COL) were filed with the Nuclear Regulatory Commission. For 2008 another 11 to 15 COL applications are expected. As a result, the industry expects four to eight new U.S. nuclear plants in operation in 2016 or so, depending on factors like commodity costs, forward prices in electricity markets and environmental compliance costs for fossil-fueled power plants.

Thermal Hydraulics plays a pivotal role in the design and safety assessment of new reactors. With growth in the job market, the senior members of the THD have a major role to play in education, mentoring and training the new and younger generation. It is an opportunity, as well as a challenge, to meet the needs. Bridging the knowledge gap between those leaving and those entering the nuclear workforce must be one of THD's and indeed ANS's, prime objectives as we move forward in a resurging industry.

Looking forward, I believe our Division has bright future and I want all our members to participate very actively in division programs. Given recent developments with new reactors, the level of enthusiasm and participation in thermal hydraulic sessions and topical meetings is rising. I like to thank my colleagues in the division and extend my welcome hand for next EC team leaders. It's truly been a great pride and privilege for me to serve you.

Please Visit the THD website for most current information pertaining to our Division's activities. You can find it at http://thd.ans.org.

Shripad T. Revankar, shripad@ecn.purdue.edu
Chairperson (2007-2008)
Thermal Hydraulics Division

Honors and Awards Committee Report

The Thermal Hydraulics Division Honors & Awards Committee has selected Dr. Jong H. Kim of Korean Advanced Institute of Science and Technology, and EPRI as the winner of 2007 THD Technical Achievement Award (TAA). The TAA award is now ANS National Award. Thus for the first time we have Dr. Kim as this prestigious national award winner. The award was presented to Dr. Kim at the ANS 2007 Winter Meeting. No Fellow or the best paper award was selected for 2007.

2007 ANS THD Technical Achievement Award

Winner; Dr. Jong H. Kim , KAIST and EPRI

The Technical Achievement Award is the highest award given by the THD. It is presented annually to a member of the THD in recognition of outstanding past or current technical achievement. It is based on a major contribution to the state of the art, an important publication, a major technical achievement, or a sustained record of accomplishment and technical excellence in the art or science of thermal hydraulics. Last year, the TAA was presented to Dr Jong Kim for his outstanding contributions to thermal hydraulic and heat transfer researches that have helped to resolve ongoing regulatory issues for nuclear power plants.

2007 ANS THD Technical Achievement Award Nominations

Nominations are now accepted for the ANS THD Technical Achievement Award. Please send an electronic copy of the nomination form and supporting documents by July 1 to THD Honors & Awards Chair (Find current chair information at: http://thd.ans.org/HonAwdCommittee.htm)

Whee Choe, choewg@westinghouse.com
2007-2008 Chair
THD Honors & Awards Committee

Treasurer's Report

For 2007, the Division's income of $19,621 comes from the 2006 carry forward and our member allocation. THD expenses are support for awards and plaques, the student conference at Oregon State University in April 2007, student

travel support to the ANS Annual Meeting (June 2007) and the ANS Winter Meeting (November 2007), and scholarships including the NEED program.

Awards-related expenses for the year 2007

- Technical Achievement Award at $1000
- Technical Achievement Award plaque at $64
- Recognition plaque for Division Chair at $60
- Young Professionals Thermal Hydraulic Research Presentation Award plaque at $67

An allocation was made for a Best Paper Award at $500 however an award was not given in 2007.

Revenue		
Type	**Item**	
Member Allocation	$1/THD Member	962
Carry Forward from 2006		17,129
Division Income from meeting revenue support		1,530
TOTAL REVENUE		**19,621**
Expenses		
Type	**Item**	
Awards, Plaques		1,191
Student Conference Support	Oregon State Univ. meeting	3,000
Student Travel Support	June 07 Meeting	250
Student Travel Support	Nov. 07 Meeting	250
Scholarship/NEED	Scholarship/NEED and THD award support	500
TOTAL EXPENSES as of 12/31/07		**5,191**
Balance as of 12/31/07		**14,430**

Income from NURETH-12

The Division will be credited with $10,698.32 as income from the NURETH-12 conference held in October 2007.

2008 Budget

For 2008, the Executive Committee approved the following expenses at the November 2007 meeting:

- $1800 for awards and plaques (same as in 2007)
- $3000 for student support (down $500 from 2007)
- $500 for Scholarship/NEED (same as in 2007)

Spending Plan

An ad-hoc Committee (Vierow, Rempe, and Cheung) was appointed by the Division Chair at the November 2007 Executive Committee meeting to evaluate the THD's long-term finances and recommend a spending plan. This plan will be presented to the Executive Committee at the June 2008 meeting.

The basic objective of the plan is to maintain a three-year reserve. An annual spending rate has been determined that considers income from domestic NURETH and ICAPP conferences, the change from meeting revenue income to an increased membership allocation and conservative estimates on projected Division membership changes. Profit share from foreign-held NURETH and all NUTHOS conferences will be allocated to the Technical Achievement Award endowment. The current practice of providing no funding for Division Officer expenses and national meeting costs is continued in the proposed spending plan.

Karen Vierow, *vierow@ne.tamu.edu*
2007-2008 Treasurer
ANS Thermal Hydraulics Division

ANS THD TAA Picture Gallery

Following plaque presentation to Dr. Jong Kim (L to R) Brian Woods, Whee Choe, Jong Kim, Yassin Hassan, Hisashi Ninokata, Shripad Revankar,

At Dinner, (L to R) Shripad Revankar, Hisashi Ninokata, Whee Choe, Jong Kim, Mrs. Kim, Joy Rempe, Richard Schultz

Program Committee Report

The activities of the THD Program Committee (PC) are supported by numerous members. The support includes organizing and chairing technical sessions, performing peer-reviews, and actively participating in division-sponsored meetings. The division organizes the NURETH conference, The International Topical Meeting on Nuclear Reactor Thermal Hydraulics. We have just completed a successful meeting in Pittsburgh, Pennsylvania in October 2007. The next one, NURETH-13, will be held in Kanazawa, Japan, from September 27 through October 2, 2009. This year, the major event that our division supports is the NUTHOS conference. NUTHOS-7 will be held in Seoul, Korea, from October 5 through 9, 2008. As of this writing, there were more than 260 abstract submittals. For more information, please visit http://www.nuthos-7.org/.

At the 2008 Annual Meeting in Anaheim, California, THD is organizing 5 contributed paper sessions with 29 summaries and 1 panel discussion with 7 panelists. The sessions are:

- Computational Thermal Hydraulics I/II [Mon. and Wed. p.m.]
- Thermal Hydraulics Aspects of Nuclear Hydrogen System – Panel [Tues. a.m.]
- Two-Phased Flow Experimentation [Tues. p.m.]
- General Thermal Hydraulics [Wed. a.m.]
- Computational Fluid Dynamics [Wed. p.m.]

The General Thermal Hydraulics session is dedicated to the memory of Prof. Gunol Kojasoy. We have lost Prof. Kojasoy in January of this year. The session will include speeches commemorating Professor Kojasoy's technical achievements.

Dr. Chang Oh and Prof. Shripad Revankar prepared a strong panel on Nuclear Hydrogen Systems with following experts as panelists:

- J. Stephen Herring (INL) – "Coupling High Temperature Electrolysis with a VHTR"
- Max B. Gorensek (SRNL) and Renee Greyvenstein (PBMR) – "Integration of the Hybrid Sulfur Cycle with a Pebble Bed Modular Reactor"
- Steven Sherman (SRNL) – "Complex Heat Transfer Networks for Nuclear Hydrogen Systems"
- Shusaku Shiozawa (JAEA) – "Status of the Japanese HTGR and Nuclear Hydrogen Program"
- Won J. Lee (KAERI) – "Thermal Hydraulic R&D on Nuclear Hydrogen System in Korea"
- Carl Sink (DOE) – "Programmatic Criteria for Evaluating Nuclear Hydrogen Production Technologies"

The session will focus on the thermal hydraulics aspects of system integration, efficiency, advantages and disadvantages of the high temperature steam electrolysis, S-1 process, and hybrid sulfur and other process.

Also noteworthy at this meeting are the sessions organized by NISD on the PHEBUS experiments in France and the ARTIST experiments in Switzerland. These experiments involve significant of thermal-hydraulic phenomena, therefore would be of interest to our members as well.

Looking ahead, for the 2008 Winter Meeting (Reno, Nevada), THD is organizing the following sessions:

1. Computational Thermal Hydraulics
2. General Thermal Hydraulics
3. General Two-Phase Flow
4. NUTHOS-7 Highlights
5. Thermal Hydraulics of High-Temperature Gas-Cooled Reactor Technology
6. Young Professional Thermal-Hydraulics Research Competition

The young professional competition, started by Dr. Donald Todd's initiative, is a well-attended session with remarkable level of preparedness of the presenters. This professional development session will provide an opportunity to enhance the technical writing and presentation skills of young professionals working in the area of Thermal Hydraulics through preparation and presentation of an extended abstract related to the Thermal Hydraulics profession. A panel of judges that provides constructive feedback on ways participants can improve their written and verbal communications skills in a technical forum will critique accepted abstracts and presentations.

As mentioned above, the support of the individuals in making the PC activities is essential. To find out more on how to get involved, please contact the Division's Program Committee chair.

Kurshad Muftuoglu, pcchair@thd-ans.org
THD Program Committee Chair

Membership Committee Report

Our official membership rolls are inching ever closer to the "numerologically" significant milestone of 1000! Of the 10,851 ANS members, 993 members have selected the THD as one of their professional divisions. Unofficially, we have over 1000 members; however, the unofficial number includes members yet to renew for 2008. Possibly more significantly than the shear number of members is that among the total ANS population, over 9% are affiliated with our division. From my records, that membership fraction is our highest fraction of total membership ever. To put this into historical context, membership in the THD peaked in 1993 with 1184 members; however, at that time the THD only represented about 7% of the total ANS membership. As a consequence of an aging workforce and our industry's recession through the rest of 90s, our membership fell, dipping to a minimum of 691 in 1999 (about 6% of total ANS membership). Today, encouraged by several successful topical meetings such as the

recent NURETH-12 in Pittsburgh, the excitement in nuclear thermal-hydraulics is as strong as ever! If you have ideas on how we can continue to improve membership and our service to members, feel free to contact myself or any of the division officers to let them know.

Robert Martin, robertp.martin@areva.com
ANS THD Membership Committee Chair

Young Professional Thermal Hydraulics Research Competition

2007 Winner: Margaret Mkhosi, Purdue University
"Aerosol Particle Deposition in Pebble Beds under Low Flow Conditions " presented at the ANS/ENS International Meeting in Washington, DC, November 2007.

A plaque will be awarded at the ANS meeting in June in recognition of the most outstanding technical presentation by a Young Member of the Thermal Hydraulics Division in the 2007 Young Professional Thermal Hydraulics Research Competition. This professional development Competition was designed to enhance the technical writing and presentation skills of young members working in the area of Thermal Hydraulics through preparation and presentation of an abstract related to the Thermal Hydraulics profession. The abstract and presentation of each participant was critiqued by a panel of judges that provided constructive feedback on ways participant could improve their written and verbal communications skills in a technical forum.

Margaret was unanimously selected to receive recognition in the 2007 Competition. However, the judges and observers noted that all the participants deserve recognition for their outstanding efforts! The other participants were Michael Bingham, Nicholas DiFrancesco, Kevin Hogan, and Boyan Neykov.

Call for Papers - 2008 Young Professional Thermal Hydraulics Research Competition

The Young Professional Thermal Hydraulics Research Competition will be held again this year, this time at the Reno Meeting in November. The professional development session is designed to enhance the technical writing and presentation skills of young professionals working in the area of Thermal Hydraulics through preparation and presentation of an abstract related to the Thermal Hydraulics profession. Accepted abstracts and presentations will be critiqued by a panel of judges that will provide constructive feedback on ways participants can improve their written and verbal communications skills in a technical forum.

All THD members who are less than 36 years old or have less than five years of experience working in the area of Thermal Hydraulics are encouraged to participate. A plaque will be awarded to the participant selected by the judging panel that gave the best oral presentation in the session. All experienced professionals who are interested in judging the presentations are asked to contact the session organizer, Donald Todd.

Finally, THD members are strongly encouraged to attend the session in November. Please come out and show your support to the next generation of engineers working in our field of Thermal Hydraulics. You might even learn a few things, too!

For more information, please see the link below or contact

Donald Todd, donald.todd@areva.com
Coordinator, ANS THD Young Professional Members

Web Page Report

The THD website (http://thd.ans.org) is your "one-stop shop" for recent and upcoming events of interest to thermal-hydraulic practitioners as well as an archive of historical records going back nearly 20 years. On the front page you can find our current newsletter and call for papers for upcoming meetings. Dig beneath the surface a bit and you can find other useful information about author guides (possibly in need of updating), THD committee business, governance documents, contact information of THD officers (both past and present), previous THD newsletters, and instructions for nominating a colleague for our prestigious Technical Achievement Award. Be sure to visit it as your first source of information on the THD. Your comments and suggestions about content appearing on our site can be directed to me.

Robert Martin, robertp.martin@areva.com
ANS THD Web Site Manager

Nominating Committee Report

Results from the recent ANS elections are official! We have the following new Division Officers and Executive Committee members who are incoming THD Officers this June 2008.

Executive Committee (3 year term)

Current Year THD Officers (July 2007-June 2008):
Division Chair: Shripad Revankar, *shripad@ecn.purdue.edu*
Vice Chair: Chang Oh, *chang.oh@inl.gov*
Treasurer: Karen Vierow, *vierow@ne.tamu.edu*
Secretary: Kune Suh, *kysuh@snu.ac.kr*

Incoming THD Officers (July 2008-June 2009):
Division Chair: Chang Oh, *chang.oh@inl.gov*
Vice Chair: Karen Vierow, *vierow@ne.tamu.edu*
Treasurer: Kune Suh, *kysuh@snu.ac.kr*
Secretary: Hisashi Ninokata, *hninokat@nr.titech.ac.jp*

Executive Committee Members

Kurshad Muftuoglu (2010) *muftuoak@westinghouse.com,*
Xiadong Sun (2010) *sun.200@osu.ed*

Fan-Bill Cheung (2009)	*fxc4@psu.edu*
Whee Choe (2009)	*whee.choe@txu.com*
Yassin Hassan (2009)	*y-hassan@tamu.edu*
Hisashi Ninokata (2009)	*hninokat@nr.titech.ac.jp*
Don Todd (2009)	*donald.todd@areva.com*
Robert Martin (2010)	*RobertP.Martin@areva.com*
Brian Woods (2011)	*Brian.Woods@oregonstate.edu*
Prof. H. C. No (2011)	*hcno@kaist.ac.kr*

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.

Joy Rempe, Joy.Rempe@inl.gov
2007-2008 Chair
THD Nominating Committee