

Minutes
ASME Research & Technology Subcommittee on the Properties of Water and Steam
Gaithersburg, MD, April 27-28, 2005

Attendance:

Jim Bellows, Siemens Westinghouse (Chair)
Dan Friend, NIST (U.S. IAPWS Delegate)
John Gallagher, NIST
Allan Harvey, NIST (Secretary)
Bob Hendricks, NASA
Anneke Levelt Sengers, NIST
Serguei Lvov, Penn State University
Digby Macdonald, Penn State University
Bill Parry, General Electric
Jan Sengers, University of Maryland

[NOTE: Items numbered as on Preliminary Agenda, which is attached]

1 & 2. Approval of Agenda and Previous Minutes

A preliminary agenda (attached) was distributed and approved with minor additions. Draft minutes of the Fall 2004 meetings were circulated and were approved subject to the making of minor corrections. [**Action:** Bellows to make minor corrections to Pittsburgh minutes and transmit to Norma Johnston at ASME.]

3. ASME Steam Tables Book

Total sales as of 4/21/05 are 870, reflecting 125 books sold in the last 12.5 months. No new Errata have been found in the last year. There are 113 copies left in the current (second) printing.

It was discussed that a Second Edition would be appropriate when new IAPWS formulations were adopted for viscosity and thermal conductivity. This will be at least 2 or 3 years, so the next printing will still be the First Edition, with Errata corrected. It was decided that a “minimum” next printing of 300 would be appropriate. [**Actions:** Gallagher to prepare 2 corrected Figures for the next printing and e-mail them to Harvey. Harvey to collect material for corrected printing and transmit to ASME Press by our Fall meeting.]

4. ASME Steam Tables Software

Total sales are 494 “Professional” version and 37 “Student” version, reflecting 26 Professional and 4 Student in the past 12.5 months, a slightly higher rate than last year. Current Version 1.1 has not had any bugs reported yet except for one minor problem that showed up with a certain compiler.

There is need for a DLL to allow steam tables functions to be called from applications such as Excel; Bill Parry reported on his efforts in that regard. An important issue is being able to keep the Fortran names identical. A Task Force of Parry, Bellows, and Gallagher was formed to define critical items for this product, and funding of up to \$3000 was authorized to support this effort. [**Actions:** Task Force to have “beta” version ready by next meeting. Parry to contact ASME Press (Mary Grace Stefanchik) to make sure ASME is willing to support such a product. Parry to send current version to Bellows, Gallagher and Harvey.]

IAPWS is coming out with further “backward” equations to save computing time. Consideration of whether these should be in our software, along with issues of testing future software updates and of possible use of the .NET framework, were deferred but should be on future agendas. [**Action:** Harvey and Bellows put these items on Orlando agenda.]

5. ASME Restructuring

This agenda item was covered by Michael Tinklemann of AMSE in the meeting of the Main Committee (ASME Research and Technology Subcommittee on Water and Steam in Thermal Systems). See their minutes (and the “Continuity and Change” section of www.asme.org) for details.

6. Web sites

Allan Harvey reported on the Subcommittee and IAPWS Websites. The only significant change since the previous meeting was the addition of a document about the history of this subcommittee, which can now be accessed from our page which is <http://www.asme.org/research/wsts/steam.html>.

7. U.S. Implementation of New Formulation for General and Scientific Use

Allan Harvey reported that sales of Version 2.2 since 10/1/04 had been 27 (11 with source code). Version 2.21 was released in June 2004 for a minor revision in the IAPWS viscosity standard and also fixed some minor bugs. At some point in another year or two, an update for a new IAPWS viscosity standard will be needed, followed by thermal conductivity. There is also a proposed new IAPWS formulation for the thermodynamic properties of ice; there was discussion of whether that should be added to the product but without any clear answer.

8. Transport Properties

Dan Friend reported that a near-final version of the new IAPWS viscosity formulation should be available for the upcoming IAPWS meeting in Greece, with the intention of official adoption at the 2006 meeting. The main improvements are in metastable regions and at high pressures. It was brought up that some work will still be needed to have the Release state clearly what should be done for “industrial” use. Thermal conductivity will follow but has not really been started yet except for data collection. Work on D₂O transport properties is deferred until it is decided what to do about D₂O thermodynamic properties.

9. IAPWS Issues

The 2005 IAPWS annual meeting will be July 3-8 at Santorini Island, Greece. More information is available under the “Meetings” section of www.iapws.org.

The U.S. delegate to IAPWS was instructed to vote “Yes” on the award nomination for IAPWS Fellow. Continuing concern was expressed about the lack of nominations for the IAPWS Helmholtz award. [**Actions:** Friend to inform IAPWS Executive Secretary of vote for Fellow if he has not done so already. Friend to ask IAPWS Executive Secretary to put Helmholtz award mechanism on EC agenda for Greece meeting.]

One proposed Supplementary Release (additional “backward” equations) is being circulated for expected approval in Greece. The U.S. delegate was authorized to approve this document unless some significant problem is found. [**Action:** Harvey to mention this document and include link to draft in e-mail when Minutes are circulated.] Drafts of documents for ice properties and H₂O viscosity are expected to be discussed at the upcoming meeting.

The U.S. national representative to IAPWS was instructed to pursue with the IAPWS Executive Secretary the preparation of a proper obituary for Ulrich Franck. He will also ask for the dielectric constant release and the properties of the H₂O/NaCl mixture to be on the joint TPWS/PCAS agenda, and will try to get an update from the simulation Task Group Chair. [**Actions:** Friend to do these items, and also talk to D. Archer at NIST about the H₂O/NaCl situation.]

There was nothing new to report on Agenda item 9.4.

Serguei Lvov reported on work on a new formulation for the ionization constant of water which has been accepted for publication by *J. Phys. Chem. Ref. Data*. He was encouraged to pursue making this an IAPWS Guideline and also to pursue getting an ICRN on this issue.

Some material from the IAPWS Environmental Issues Task Group was considered. It was decided that this Task Group should be encouraged to guide the Working Groups in discussing these issues at the meeting in Greece and to make a presentation at the joint TPWS/PCAS session. [**Action:** Friend to transmit this request to TG Chair Okita.]

The IAPWS monograph (*Aqueous Systems at Elevated Temperatures and Pressures: Physical Chemistry in Water, Steam and Hydrothermal Solutions*) was published in 2004 and seems to be well received. It had a favorable review in a geochemical journal. [**Action:** Harvey to ask D. Palmer to send copy of that review to chapter authors.]

10. Membership

The lack of participation in the U.S. national committee by IAPWS PCAS people was discussed. Holding a Symposium of some sort with the Gaithersburg meetings (as was done this year) was endorsed.

11. Old Business

In recognition of their support of the Subcommittee, it was decided that General Electric and Siemens Westinghouse should receive copies of the IAPWS Monograph and of the Proceedings of the Kyoto ICPWS. These should be accompanied by a cover letter from the Subcommittee Chair. Use of Subcommittee funds to purchase these books was authorized. [**Actions:** Harvey to work with Norma at ASME to order books. Bellows to write cover letters and send GE cover letter to Harvey for inclusion in mailing. Harvey to get books sent to Bellows for Siemens Westinghouse and to Parry (with cover letter) for GE.]

The interaction (or lack thereof) of the ASME Power Plant and Environmental Chemistry (PPEC) committee with IAPWS Power Cycle Chemistry (PCC) was discussed, and some small steps forward were suggested. [**Actions:** Bellows to send a draft list of U.S. PCC priorities to some PPEC people to give them an opportunity to comment. Bellows to ask Len Olavessen if IAPWS PCC minutes can be circulated to PPEC.

It seems that the acceptance of IAPWS-IF97 throughout the power industry is happening, but slowly. The Power Test Codes (such as PTC-6) are one area where making sure IF97 is mentioned would help. [**Action:** Bellows to contact a colleague involved with PTCs on this issue.]

12. New Business

With regard to finances, Jim Bellows still needs to send our report and request for 2005 funding to Norma at ASME to be forwarded to EPRI. It was decided that a 5-year plan should be discussed at our next meeting. [**Actions:** Bellows to transmit report to Norma ASAP. Bellows and Harvey to put 5-year plan on agenda for next meeting.]

13. Next Meetings

Our Fall 2005 meeting will be held in conjunction with the International Water Conference in Orlando, FL. This Subcommittee will meet all day on Wednesday, October 12, at the Siemens Westinghouse facility in Orlando. The Main Committee will meet at 5 PM on Tuesday October 11 at the IWC meeting site (Hilton in the Walt Disney World Resort, Orlando). [**Action:** Bellows to arrange meeting facilities at Siemens Westinghouse.]

In Spring 2006, we will meet at NIST-Gaithersburg on Wednesday and Thursday, April 26-27. It was tentatively decided to hold the Fall 2006 meeting at the GE facility in Schenectady, NY, on the Thursday immediately following the IWC (which will probably be in Pittsburgh).

Respectfully submitted,
Allan Harvey, Secretary

Preliminary Agenda
ASME Subcommittee on Properties of Water and Steam

Location: NIST, Gaithersburg MD
Time: Wednesday-Thursday, April 27-28, 2005

- 1. Approval of Agenda**
- 2. Approval of Minutes**
- 3. ASME Steam Tables book**
 - 3.1. Report on sales Allan Harvey
 - 3.2. Errata Allan Harvey
 - 3.3. Future plans, next printing Harvey, All
- 4. ASME Software for IAPWS-IF97**
 - 4.1. Report on sales and new Version Allan Harvey
 - 4.2. Technical support John Gallagher
 - 4.3. Known bugs and problems John Gallagher, Allan Harvey
 - 4.4. Possible DLL/Excel product Bill Parry
 - 4.5. Plans for new backward equations Allan Harvey, Bill Parry
 - 4.6. Testing of future versions Bellows, Harvey, Parry
- 5. ASME restructuring issues Tinklemann**
- 6. U.S. Subcommittee and IAPWS Web pages Allan Harvey**
- 7. Update on implementation of general/scientific formulation Allan Harvey**
- 8. Report on transport properties Dan Friend**
- 9. IAPWS issues**
 - 9.1. IAPWS Awards, particularly Helmholtz award Dan Friend
 - 9.2. IAPWS documents for approval Dan Friend
 - 9.3. 2005 in Greece Dan Friend, All
 - 9.4. Fuel cells, electrochemical systems task groups Serguei Lvov
 - 9.5. Proposed Guideline for Kw Serguei Lvov
 - 9.6. Environment proposal (see p. 2) All
- 10. Membership**
 - 10.1. How does US committee develop a PCAS component? Bellows, All
- 11. Old Business**
 - 11.1. Books and proceedings to EPRI and sponsors of 2001 meeting Bellows, All
 - 11.2. PPEC participation in IAPWS PCC? Bellows, All
- 12. New Business**
- 13. Next Meeting – Time, Place, etc.**
- 14. Adjournment**