

**Minutes: Properties Subcommittee,
ASME Research & Technology Committee on Water and Steam in Thermal Systems
Schenectady, NY, November 2-3, 2006**

Attendance:

Mikhail Anisimov, University of Maryland
Jim Bellows, Siemens Power Generation (Chair)
Dan Friend, NIST (U.S. IAPWS Delegate)
John Gallagher, NIST
Allan Harvey, NIST (Secretary)
Rich Harwood, Siemens Power Generation
Bill Parry, General Electric
Jan Sengers, University of Maryland

[NOTE: Items numbered as on Preliminary Agenda, which is attached. Numbering reflects order on agenda, not order in which items were actually discussed.]

1 & 2. Approval of Agenda and Previous Minutes

A preliminary agenda (attached) was distributed and approved with the provision that the order of considering items would be changed. Minutes of the Spring 2006 meeting were approved.

3. ASME Steam Tables Book

Total sales as of 10/20/06 are 1061, reflecting 144 books sold in the last 13 months. One new Erratum (error in an axis label on a chart) has been found and posted on the web since the last meeting. Annual sales have been “flat” for several years.

Timing for a Second Edition was discussed in light of IAPWS work in progress that would affect the viscosity, thermal conductivity, and Region 5. It was decided that we would tentatively wait for all three of these to be finished, but would reassess when the viscosity and Region 5 were done when we would have a better idea of how long we would have to wait for the thermal conductivity.

Compact Steam Tables (mistakenly listed as 9c on agenda): Allan Harvey reported that the 32-page booklet *ASME Steam Tables: Compact Edition* was now in print, and one university had already bought 500 copies. It was discussed that this would likely be of significant interest for both students and industry, and ideas for promoting it were discussed.

[Action: Harvey to contact Mary Grace at ASME Press with suggestions for promotion.]

It was decided that this booklet would make a good item for our Subcommittee to give away on various occasions (for example, as appreciation for help in hosting our meetings).

It was moved and seconded that the expenditure of funds from our Custodial Account be authorized to purchase two packets of 10 booklets. The motion was passed unanimously.

[Action: Harvey to contact Norma as ASME about placing this order.]

4. ASME Software for IAPWS-IF97

Total sales are 521 “Professional” version, reflecting 21 Professional in the past 13 months, a nearly constant rate over the past few years.

Current Version 1.1 has had a few minor bugs show up, but nothing major.

[Actions: (left over from last time) Harvey and Parry to look at tightening convergence tolerances on H and S for next version.]

Bill Parry reported that, due to other commitments, there had been little progress on the DLL and Excel add-in for steam properties. Much testing and refining still needs to be done, including error handling and documentation. Issues of how to deal with operating-system upgrades need to be thought about.

[**Actions:** (Most left over from last time) All do as much testing as possible, distributing a small number of copies as needed in order to facilitate more testing in their organizations, and reporting significant problems needing attention to Bill Parry copied to Karen Tyler. Friend and Harvey to get student help at NIST to check the documentation when it becomes available. Bellows and Jacobsen to get student help in testing. Parry to add simple functions like VPT and SPT if easily feasible. Parry and Harvey to check with Mary Grace Stefanchik at ASME Press about packaging and pricing.]

5. ASME Issues

ASME is moving forward slowly on the financial restructuring that we have been led to believe would eventually lead to royalties for our publications. A 10% royalty has already been built into the price for the Compact Edition of the Steam Tables. A “Financial Accounting and Information Reporting” (FAIR) Task Force, has been appointed to look at these issues.

[**Action:** Bellows to write to the Chair of the FAIR Task Force with our concerns, if Dick Jacobsen thinks it will be worthwhile.]

6. Web sites

There was little new to report on this item, other than the addition of links to the new booklet.

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

Allan Harvey reported that sales of Version 2.2 in Fiscal 2006 had been 47 (26 with source code), with sales roughly constant for several years. At some point in another year or so, an update for a new IAPWS viscosity standard will be needed, followed by thermal conductivity. It was decided that the new IAPWS release for properties of ice did not belong in this product, and NIST was authorized to disseminate properties from that release in any manner it saw fit.

8. Transport Properties

Jan Sengers reported that, after some small adjustments, the revised formulation for the viscosity is almost ready to be sent out again to the Evaluation Task Group. If no other problems come up, there should be sufficient time for a 2007 IAPWS adoption. Due to the complications with the viscosity, there has been little progress so far on thermal conductivity, but it will be started soon.

9. IAPWS Issues

The U.S. has been asked to supply the IAPWS Vice-President for the 2007-2008 term. *It was unanimously agreed that Dan Friend should serve in this capacity.*

[**Action:** Friend to inform IAPWS Executive Secretary that he will serve as Vice-President.]

It was decided that we would not submit a nomination for IAPWS Fellow this year. With regard to the Helmholtz award where the National Delegate may be asked to review nominations coming from the U.S., Dan Friend was authorized to deal with such nominations as he sees fit, consulting with others if needed. The nomination deadline for the Gibbs award is May 31, so any nomination from the U.S. will be decided at our next meeting.

With regard to IAPWS awards, there was some discussion about how to publicize them.

[**Action:** Friend to check with Dick Jacobsen as to whether these can be listed as ASME-affiliated prizes in some of the same places ASME awards are listed. Friend to consider the possibility of sending out flyers about the Helmholtz award to a suitable list in future years.]

There were 6 proposed ICRNs from IAPWS; we must respond with our approval or suggestions for changes by February 1. It was decided that Allan Harvey would coordinate our response for documents 16 and 21, with Jim Bellows coordinating the response for documents 17, 18, 19, and 20. Others with comments on these documents (available under www.iapws.org/drafts/) should direct their input to these people.

[**Actions:** Harvey and Bellows to send Friend their comments on these proposed documents. Friend to communicate the official U.S. response to the IAPWS Executive Secretary before February 1.]

The need to know as soon as possible the 2007 IAPWS meeting dates was discussed.

[**Update:** Shortly after the meeting, we learned that it will be Aug. 26-31 in Luzern, Switzerland, with a technical tour on Sept. 1.]

The need to revive the area of computer simulation in IAPWS was discussed.

[**Action:** Friend to convey our concern about this area to the incoming IAPWS President (Cooper) and to the Chairs of Working Groups TPWS (Kretzschmar) and PCAS (Lvov).]

10. Membership

There was discussion about the perennial concern of building more of a physical chemistry component for our committee and the U.S. participation in IAPWS. It was suggested that we might wish to co-locate a Fall committee meeting with some meeting that would attract such people.

[**Action:** Bellows to ask S. Lvov about such meeting location options starting in 2008.]

11. Old and New Business

The status of item 11a was unknown.

[**Action:** Bellows to check with Norma Johnston at ASME about our book order, which was authorized as recorded in our Fall 2005 minutes. Bellows to write cover letters to go with books. Parry to provide contact address for who the book should go to at GE.]

[For agenda item 11b, see Minutes item 4 above.]

On item 11c, the Chair had been asked to provide reviewers for a paper submitted to the ASME's *Journal of Engineering for Gas Turbines and Power*. Some suggestions were made, and Bill Parry agreed to look for a GE reviewer (possibly himself).

[**Actions:** Parry to communicate GE reviewer to Bellows if he has not done so already. Bellows to communicate names to journal Editor.]

On item 11d, Jim Bellows reported briefly on the amine project, which has achieved interesting preliminary results.

12. Next Meetings

In Spring 2007, we will meet at NIST-Gaithersburg on Wednesday and Thursday (probably just the morning on Thursday), April 18-19. We will consider having a mini-symposium, probably April 18, on issues surrounding steam purity recommendations (if it does not work out, this can be a topic for the Fall 2007 meeting).

[**Actions:** Bellows to contact his counterpart at GE, and also to try and get a user and/or E&C perspective (Steve Shulder? somebody from Bechtel?) to see if they could participate. Sengers to

contact Eric Luijten to see if he or a colleague might have an appropriate contribution. Harvey to arrange Gaithersburg scheduling if this comes together.]

In Fall 2007, we will meet at the Siemens Power facility in Orlando, FL, immediately following the International Water Conference the week of October 21. The program will include a half-day Symposium (probably scheduled prior to the official committee meeting) such as the one held in conjunction with this meeting.

[**Action:** Bellows to begin organizing facilities and meeting timing and considering what symposium topics would be most fruitful for Siemens people.]

Symposium

A Symposium was held on Friday, November 3, with topics as described on the attached agenda.

The Subcommittee met briefly following the Symposium to discuss what we had heard and possible future directions. Some of that is reflected in the symposium plans listed in item 12 above. There was consensus that properties and behavior of metastable steam and wet steam and the condensation transition was an area where greater understanding was needed, but without an expert to lead the area we are not really in a position to pursue it.

It was decided that the symposium had been worthwhile, and something similar should be done at Siemens in Orlando next October. The hospitality of our hosts at General Electric was greatly appreciated.

[**Action:** Bellows and Harvey to work on a letter of thanks to be sent to Karen Tyler at GE.]

Respectfully submitted,
Allan Harvey, Subcommittee Secretary

Agenda
ASME Subcommittee on Properties of Water and Steam
Fall Meeting, November 2, 2006

Location: General Electric, Schenectady

Time: Thursday, November 2, 2006, 8 AM – 4 PM

1) Approval of Agenda

2) Approval of Minutes

3) ASME Steam Tables book

- 3a) Report on sales
- 3b) Errata
- 3c) Future plans

Allan Harvey
Allan Harvey
All

4) ASME Software for IAPWS-IF97

- 4a) Report on sales and new Version
- 4b) Technical support
- 4c) Known bugs and problems
- 4d) DLL/Excel product
- 4d) Plans for new backward equations
- 4e) Testing of future versions

Allan Harvey
John Gallagher
John Gallagher, Allan Harvey
Bill Parry
Allan Harvey, Bill Parry
Bellows, Harvey, Parry

5) ASME restructuring issues

Jacobsen

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

- 9a) IAPWS in Witney, Oxfordshire
- 9b) IAPWS Awards, particularly Helmholtz & Gibbs award
- 9c) Update Compact Steam Tables
- 9d) IAPWS documents for approval, if any
- 9e) 2006 in Switzerland
- 9f) Fuel cells, electrochemical systems task groups

Dan Friend
Dan Friend, Jim Bellows
Allan Harvey
Dan Friend
Dan Friend, All
Serguei Lvov

10) Membership

- 10a) How does US committee develop a PCAS component?

Bellows, All

11) Old & New Business

- 11a) Books and proceedings to EPRI and sponsors of 2001 meeting
- 11b) PPEC participation in IAPWS PCC?
- 11c) Reviewer for Kretschmar paper
- 11d) Report on Amine project

Bellows, All
Bellows, All
Bellows, All
Bellows

12) Next Meeting – Time, Place, etc.

13) Adjournment

Symposium, November 3, 2006

- I. Steam Tables: Past, Present and Future. Allan H. Harvey, NIST
- II. Rapid Expansions in Wet Steam Turbines, William (Bill) Sumner and Tao Guo, General Electric
- III. Nucleation, Drop Growth and Metastability: A Droplet Near the Critical Point, Mikhail Anisimov, U. MD.
- IV. Power Plant Chemistry and Corrosion, James Bellows, Siemens Power Generation
- V. Computational Fluid Dynamics - Need for Fast Properties & Interpolation Routines, Andrey Chernobrovkin, GE
- VI. IAPWS and the Transport Properties of H₂O, Jan Sengers, U. MD.