

**Minutes: Properties Subcommittee,  
ASME Research & Technology Committee on Water and Steam in Thermal Systems  
Gaithersburg, MD, April 4, 2018**

Attendance:

Richard Harwood, Siemens Energy (Chair)  
Jim Bellows, James Bellows & Associates  
Dan Friend, NIST (U.S. IAPWS Delegate)  
John Gallagher, NIST  
Allan Harvey, NIST (Secretary)  
Anneke Levelt Sengers, NIST  
Jay Patel, General Electric (by phone)  
Jan Sengers, University of Maryland

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

1-2. Approval of Agenda and Review of Action Items

A preliminary agenda was distributed and approved. Minutes of the Fall 2017 meeting had been approved by email. Progress on action items was briefly reviewed. Pending **Action** items are mentioned under related agenda items below.

3. ASME Steam Tables Books

The Third Edition of the book became available for sale in mid-2014. Total sales of the Third Edition so far are 293 copies (about 55 sales in the past 12 months).

The Compact Steam Tables booklet has sold over 13,300 copies, with approximately 450 in the past 12 months; this is a slight decrease compared to the previous few years.

4. ASME Software for IAPWS-IF97

Two copies of the old “Professional” version were sold in the past year (636 over lifetime of product). No new support requests had been received.

For the new DLL software, Jay Patel reported on progress. There is still testing needed, and also work on the manual. We have the following **Action** items for moving forward:

- o Patel distribute latest version for use by May 7.
- o Harvey send Patel a list of emails for distribution.
- o Patel test C# wrapper to protect against Excel crashes, and implement for June 4 revised distribution if it works. If it does not work, explore other approaches.
- o Patel get draft manual to group for next round of checking by June 30. Bellows check for older Word version, and also see ASAP if he can convert the watermarked PDF.
- o Bellows send Patel his Mollier chart spreadsheet for inclusion as an example.
- o All: Test May 7 version and give any feedback by June 20, with feedback on manual within 3 weeks of distribution of manual.
- o Patel: Continue to work with GE and ASME legal to renegotiate the steam property license for GE (probably as a modification of the 2003 agreement) and also establish that those on the Committee that helped with testing, etc. can get individual copies.
- o Patel: Resolve issues identified in testing by July 20, sending out next iteration if necessary, with goal of sending completed version to ASME Press by August 15.
- o Harvey: discuss pricing with ASME Press (see Fall 2014 Minutes in which we decided to suggest \$200 for the basic Add-in and \$400 with source code included) after above items are complete.

- Harwood (and potentially others) work out arrangement with ASME Press for their use of the software, preferably with provision that rights are transferred for as long as ASME continues to pay IAPWS dues.

Incorporation of splines for fast calculation (according to the new IAPWS Guideline) and thermodynamic derivatives (IAPWS Advisory Note) for our software in the future are deferred until after this first version of the software is issued.

#### 5. U.S. Implementation of Formulation for General and Scientific Use

Sales of Version 3.0 of the NIST software were 8 in the first half of FY 2018, a small decrease over the previous period. A minor update will be made in 2018 to include some equilibrium-related properties (like fugacity) accidentally left out of the interface in Version 3.0.

#### 6. IAPWS Issues

Dan Friend reported that winners had been selected for the Gibbs and Helmholtz awards, and for the Honorary Fellow award. We already have a candidate in mind to be nominated for the 2019 Honorary Fellow award.

[**Action:** Bellows explore possible Helmholtz nomination for 2019 based on a paper he saw at the IWC.]

We authorized Dan Friend to vote as he saw fit, involving other Committee members (and members of the Water Technology Subcommittee and of PPEC) as appropriate, in any IAPWS documents that come up between now and the next IAPWS meeting.

The 2018 IAPWS meeting and ICPWS will be in Prague, Czech Republic, Sept. 2-7. Information is available via the Meetings section of the IAPWS website. Publicizing this and other IAPWS events in the US was discussed.

[**Action:** Harvey advertise ICPWS and May 15 early registration deadline when sending out these minutes.]

#### 7. Finances and ASME and EPRI issues

Our Segregated Account balance is approximately \$51,000.

EPRI (at least the fossil power chemistry portion of EPRI we had been dealing with) has decided they are no longer interested in supporting our IAPWS expenses. There was discussion about alternative avenues, and of ways to include EPRI in IAPWS work.

[**Actions:** Friend send Shulder (for fossil systems) and Fruzzetti (for nuclear systems) of EPRI any draft IAPWS Technical Guidance Documents. Bellows talk with Carvaggio and Fruzzetti about EPRI and IAPWS, also seeing if they have suggestions about what would be useful for IAPWS to work on (such as aqueous amine thermodynamics).]

From the GPS system, it does not appear that our January request for payment for IAPWS dues has received final approval.

[**Action:** Harvey check status with ASME person responsible. *Result of inquiry: dues have been paid; they just neglected to close the item in GPS.*]

#### 8. Old Business

Regarding keeping PPEC informed about IAPWS work, we reaffirmed that we should continue to send them drafts of IAPWS documents.

[**Action:** Bellows send contact info of current PPEC leaders to Friend.]

In the absence of Chuck Marks, no progress was reported on the possible project for revising and updating the *ASME Handbook on Water Technology for Thermal Power Systems*, so the Action items from our previous Minutes are repeated and suitably modified below.

**[Actions:** Marks prepare proposal for revising Chapter 7, potentially to be requested for ASME funding through GPS. Marks and Bellows look through book to make recommendations about what other chapters most need to be updated or rewritten.]

Jan Sengers reported that a plan has been put in place for producing new transport property correlations for heavy water. Marc Assael (IAPWS participant from Greece) will take the lead on the projects.

### 9. New Business

We began discussing ways we might celebrate the 100-year anniversary of ASME Steam Tables efforts in 2021. An article in *Mechanical Engineering* would be desirable, and perhaps a session at the annual ASME Conference or at ASME Power.

**[Actions:** Harvey prepare outline and approach ME magazine to see if they would be interested. Harvey find out who in ASME would be responsible for arranging for such a session at a meeting.]

Our current list of “long-term” topics includes: desalination and seawater; properties for carbon capture and sequestration; properties for concentrating solar power cycles; fast property calculations for CFD; non-Fortran languages (like Java) for our products and apps related to our products; the possibility of having ASME steam-tables calculations on our Subcommittee website; other working fluids such as carbon dioxide for power cycles. A new “long-term” item is our turn to host an IAPWS meeting (or maybe an ICPWS) in about 5 years.

**[Action:** Patel prepare a presentation for our Fall meeting about things we might do with our steam tables software in the future (item carried over from last time).]

### 10. Membership

Because of personnel changes at GE, Anurag Singh is no longer in a position to be Vice-Chair, but will continue as a member. **The Subcommittee elected Jay Patel of GE as its new Vice-Chair.**

### 11. Next Meetings

For Fall 2018, we decided it would be preferable to meet at GE in Schenectady if possible. Sometime in October would be preferred, preferably a Tuesday, with Oct. 16 suggested, but the availability of people at GE is important in setting the final date. We discussed having a couple of presentations from GE people as we have done in the past.

For Spring 2019, we will meet at NIST Gaithersburg on Wednesday, April 3. There was discussion of having some presentation, perhaps on critical relative humidity.

**[Actions:** Patel check on availability of GE to host meeting, and if possible propose a date by first week of May. Bellows find out Fall 2018 PPEC meeting date to be sure we don’t conflict. Bellows sketch out a brief summary of critical relative humidity and its importance, and Harvey interface to NIST humidity expert to see if he could contribute on that topic.]

### 12. Adjournment

The meeting adjourned at approximately 2:30 PM.

## Preliminary Agenda: ASME Subcommittee on Properties of Water and Steam

**Location:** NIST Admin Bldg, Room B-113, Gaithersburg, MD

**Time:** Wednesday, April 4, 2018, 9:30 to 5:00 [*“Main Committee” at 8:30 in Lecture Room B*]

- 1. Approval of Agenda**
- 2. Review of Action Items from Fall 2017 Minutes**
- 3. ASME Steam Tables book and booklet**
  - 3.1. Report on sales Allan Harvey
- 4. ASME Software for IAPWS-IF97**
  - 4.1. Report on sales Allan Harvey
  - 4.2. Technical support, bugs John Gallagher, Harvey
  - 4.3. Code revision and DLL/Excel product Jay Patel (relayed by Harvey)
  - 4.4. Plan for completing DLL/Excel product Patel, All
  - 4.5. Future incorporation of splines, derivatives?
- 5. Update on implementation of general/scientific formulation** Allan Harvey
- 6. IAPWS issues**
  - 6.1. IAPWS Awards Dan Friend
  - 6.2. IAPWS documents for consideration Dan Friend
  - 6.3. Preparation for 2018 ICPWS in Prague
- 7. Finances and ASME issues**
  - 7.1. Committee finances Harwood, Harvey
  - 7.2. Possible EPRI agreement for some IAPWS costs Harvey, Friend
- 8. Old Business**
  - 8.1. US participation in IAPWS PCC activities (EPRI, PPEC) Friend, Bellows
  - 8.2. Revision of ASME Handbook (deferred) Marks, Bellows
  - 8.3. Work on heavy water transport properties Jan Sengers
- 9. New Business**
  - 9.1. 2021 100-year anniversary of ASME steam tables work
  - 9.2. Review of “long-term” items All
- 10. Membership**
- 11. Next Meetings:** Fall 2018 (Schenectady? Boulder? Scottsdale? Gaithersburg?); April 3, 2019 in Gaithersburg
- 12. Adjournment**