

**TC 1.3 Minutes**  
**Winter Meeting 2010 (Orlando, Florida)**  
**ASHRAE TC 1.03 – Heat Transfer and Fluid Flow**

**General Meeting:** 1:00 p.m. to 3:30 p.m., Tuesday, (January 26, 2010), **Rosen Shingle Creek** hotel, **Suwannee 20 (Level 2)**.

Branko Korenic called the meeting to order at 1:04 PM.

**1. Introductions**

- a. Branko read the title, purpose and scope of TC 1.3
- b. Attendees introduced themselves.

**2. Confirmation of quorum**

- a. Eleven of thirteen voting members were present, confirming the quorum..
- b. Voting members present were Branko Korenic, Axel Kriegsmann, Lorenzo Cremaschi, Rick Couvillion, Bruce Nelson, Joe Huber, Jon Hartfield, Michael Ohadi, Amir Jokar, John Thome, and Justin Kauffman.
- c. Voting members absent were Samuel Yana Moto and Zahid Ayub.

**3. Approval of the Minutes from the previous meeting in Louisville, KY.**

- a. After taking a few minutes to review the minutes from Louisville, Jon Hartfield made a motion to approve the minutes as distributed.
- b. Rick Couvillion seconded the motion.
- c. The motion passed with a vote of eleven for, none opposed, none abstained (11-0-0).

**4. Liaisons' Comments**

- a. TAC Liaison – Victor L. Penar
  - i. Roster changes must be dropped off in the box by Tuesday evening.
  - ii. If any mistakes are found, Victor will contact Jon Hartfield (membership chair) and he can correct the roster accordingly. Those corrections would be due to Victor by 15 February 2010 to be so that they can be submitted 28 February 2010.
  - iii. The international membership classification has been removed and in its place is a new category titled voting member non-quorum. The TC chair may appoint any two members to this category. These members will count toward a quorum when present, but will not count against in when absent. The names of these two members must be submitted annually as a matter of record, as voting membership changes annually.
  - iv. If the webmaster is experiencing any problems in maintaining the TC website, he is to contact Victor.
- b. Research Liaison - Sriram Somasundaram

- i. The research liaison's only comments were in response to a question about projects going out for bid. Because of ASHRAE's cash flow shortage, no projects went out for bid in the fall. As a result, many projects are expected to be ready for bid in the spring. The research liaison expected that the projects would be prioritized by cost of the project, project duration, and the length of time the project has been ready to go out for bid.

**5. Report from Membership Sub-Committee Chair (J. Hartfield)**

- a. TC 1.3 currently has thirteen voting members. Five are from academia and eight are from industry. Of the thirteen voting members, two are international members.
- b. TC 1.3 currently has forty-one corresponding members.
  - i. Jon sends an email to the corresponding members every other year to confirm their continued interest in the committee. He did not send the email in 2009, and so he plans to send the email this year (2010).
- c. Roster for 2010-2011 (1 July 2010 – 30 June 2011)
  - i. After the Albuquerque, NM meeting four voting members will be rolling off:
    - 1. John Thome
    - 2. Michael Ohadi
    - 3. Zahid Ayub
    - 4. Bruce Nelson.
  - ii. Three members have been identified to roll on as voting members:
    - 1. Petur Thors
    - 2. Steve Eckels
    - 3. Ken Schultz
  - iii. With these changes, the voting membership for 2010-2011 will include five from academia and seven from industry.
- d. If anyone is interested in becoming a member of TC 1.3, he/she should provide Jon Hartfield with a business card and his/her ASHRAE member number.

**6. Report from Program Sub-Committee Chair (A. Jokar)**

- a. General Comments
  - i. Steve Eckels suggested that conference paper sessions may be more likely to be accepted by ASHRAE than seminars. He also suggested that conference papers may be a reasonable first step for presentation without sacrificing archival publication because the paper could also be beefed up and submitted to HVAC&R for archival.
  - ii. There were many questions in general regarding conference papers.
  - iii. At the research review meeting, Rob Risley brought papers that need reviewing for Albuquerque. Contact Joe Huber if you are interested in reviewing the papers. Topics include:
    - 1. Flow boiling heat transfer at low temperatures.
    - 2. Low Reynolds number airflow heat transfer.

3. An evolutionary computational approach for heat transfer calculations.
- b. Programs for this meeting, Orlando, FL
    - i. The TC is cosponsoring Seminar 75, "Recent Advances in Heat Transfer and Fluid Flow".
      1. This seminar had been submitted for Louisville but was rejected due to the large number of program entries and limited number of program openings.
      2. ASHRAE suggests that if a seminar is rejected, when resubmitted it may receive priority.
    - ii. The TC is also sponsoring Forum 10, "Micro and Nano Systems and their Future Potential in HVAC and Energy Systems."
  - c. Future Programs
    - i. Albuquerque, NM (26-30 June 2010)
      1. Amir Jokar made a motion to submit a seminar titled "Refrigeration Systems Using Environmentally Friendly Refrigerants".
        - a. Branko Korenic Seconded.
        - b. The motion passed by a vote of eleven for, none opposed, none abstained (11-0-0).
        - c. This seminar had been submitted for Orlando and was rejected.
      2. Michael Ohadi suggested a seminar titled "Advances in Micro and Nano Technologies in HVAC&R".
        - a. This would build off of the forum presented in Orlando.
        - b. Michael Ohadi would chair the seminar.
        - c. A suggested speaker is Mark Kedzierski with NIST.
      3. Key dates
        - a. Seminar and Forum program proposals are due 12 February 2010.
        - b. Final conference papers and final technical papers are due 12 March 2010.
    - ii. Las Vegas, NV (29 January – 2 February 2011)
      1. The TC intends to move the conference paper session titled "Heat Exchangers for Hot, Dry Environments" from Albuquerque to Las Vegas.
        - a. It was suggested that the title could be broadened to increase the scope because additional papers are needed.
        - b. It was suggested to contact TC 5.7 (Evaporative Cooling) and TC 8.6 (Cooling Towers and Evaporative Condensers) to find additional papers.
      2. Key dates
        - a. Conference paper abstracts are due 9 April 2010.
        - b. Technical papers are due for review 9 April 2010.
        - c. Seminar and Forum program proposals are due 6 August 2010.

- d. Final technical papers due 13 September 2010.
    - e. Final conference papers are due 8 October 2010.
  - iii. Montreal, Canada (25-29 June 2010)
    - 1. Steve Eckels suggested a seminar titled “Advances in Heat Transfer and Fluid Flow.” Seminars of this type have been successful in the past.
    - 2. Key dates
      - a. Dates are not yet defined for Montreal submission.
- 7. **Report from Handbook Sub-Committee Chair** (R. Couvillion)
  - a. Handbook has been out for several months and no negative comments have been received.
  - b. Review processes are underway.
  - c. Steve Eckels and Ken Schultz had previously agreed to take over two-phase chapters. Chapter was just published last summer, so there are 3.5 years to next release.
  - d. CD+ portion of handbook may be updated as corrections are made.
  - e. Rick asked if fluid property chapters should be reviewed for updates.
- 8. **Report from Webmaster** (Darren Nutter)
  - a. Jon Hartfield noted that Darren Nutter has asked to step down from the webmaster position.
  - b. Ebrahim Al-Hajri has agreed to take over as webmaster.
  - c. After discussion among the TC, Ebrahim plans to add the membership list to the TC website, along with information regarding current research and information about TC 1.3 sponsored programs.
- 9. **Report from Research Sub-Committee Chair** (J. Huber)
  - a. Research SC chair comments from research breakfast
    - i. Conference paper is a new vehicle to present research.
    - ii. RTAR/WS deadline for consideration is May 15, 2010.
    - iii. Funding status
      - 1. No projects went out for bid last fall.
      - 2. Quite a few projects were started at Louisville and ASHRAE currently has cash-flow concerns, so no projects went out for bid last fall.
      - 3. ASHRAE decided that the portion of dues typically sent to research were not included this year.
      - 4. At the end of February, a conference call will take place to prioritize projects that are ready for bid and will decide how many can go out for bid.
      - 5. If projects are prioritized they may go out for bid in the Spring, otherwise they will be held until Fall 201.
    - iv. 2010-2015 strategic research plan
      - 1. Web link (<http://www.ashrae.org/technology/page/39>)
      - 2. Last day for comments is February 22, 2010.

3. ASHRAE is changing the way they do research plans... noting that lessons were learned from the 2005-2010 plan.
4. Tactical research will not be discounted.
- v. How is prioritization achieved ?
  1. See Research liaison comments above.
- b. Current research
  - i. TC 1.3/8.5 held a joint research review on Sunday, and three projects reviewed.
  - ii. **RP-1352 – Evaporation in Corrugated Plate Heat Exchangers with Ammonia and Ammonia/miscible oil** (PI: S. Khan, PMS Chair: Z. Ayub).
    1. Joe Huber comments in Zahid's absence:
      - a. Experimental work is complete.
      - b. 95% of correlation work is complete.
      - c. Presented for pure NH<sub>3</sub> on all 3 plates, presented data and tentative correlations for NH<sub>3</sub>/Oil data.
      - d. In process of finishing project and writing report.
      - e. Time has expired for this project.
      - f. Joe Huber motions to grant a no cost extension through August 2010
        - i. Branko Korenic seconded the motion.
        - ii. The motion passed by vote of eleven for, none opposed, none abstained (11-0-0).
  - iii. **RP-1444 – Experimental Evaluation of Two-Phase Pressure Drop and Fluid Flow Patterns in U-bends for R134a, R410a, and Ammonia** (PI: J. Thome, PMS Chair: B. Nelson).
    1. Jon Hartfield comments in Bruce Nelson's absence:
      - a. PMS Bruce, Jon, Samuel, Mustafa.
      - b. Dr. Thome has shown refinements to test apparatus.
      - c. Early testing showed independence with radial position leading to fewer intrusions required.
      - d. Final version of test section:
        - i. Removes joints
        - ii. Symmetric test section
          1. Minimum disturbance and quick turnaround
      - e. U-bend gradient ~ 2x typical.
      - f. Varying diameter and bend radius, orientation, fluids.
      - g. Testing expected to last majority of 2010.
      - h. Action Item: PMS considering 3<sup>rd</sup> refrigerant, 1234ze.
      - i. Project scheduled to be completed 9/30/2010. The project experienced delays so September completion may not be possible.

No extension was passed at this meeting. Rather it was decided to review status in Albuquerque.

- iv. **RP-1327 – Flow Regime and Pressure Determination for Two-Phase Ammonia upward flow in various riser sizes** (PI: Lars Reinhold, PMS Chair: G. Grace).
  - 1. Gary Price comments.
    - a. Researcher Lars is starting to get data at -20 with 2” pipe at 2:1, 3:1, 4:1, 5:1, 10:1 configurations.
    - b. Difficulty with compressor... questions with durability.
    - c. 6” riser may pose issues.
    - d. Difficulty getting -40.
    - e. No cost extension at this point.
    - f. Initial data is showing interesting/unusual trends.
  - v. New investigator awards
    - 1. Dr. Andrew Salmers
      - a. Anisotropy surface
      - b. Planning to attend in Albuquerque, NM
      - c. Project moving well and expects to present in Albuquerque.
    - 2. Dr. Jokar
      - a. “Heat transfer and fluid flow of Nano Fluids in Micro in Mini channel heat exchangers.”
        - i. Initial CFD work to determine viability.
        - ii. Working to validate CFD code.
- c. **Long-Range Research Plan** from Louisville, KY, Meeting.
  - i. **WS-1556 “Characterization of liquid refrigerant flow emerging from a flooded evaporator tube bundle”** (J. Hartfield).
    - 1. No funding, so hopefully out for bid in the spring.
- d. **Other topics of interest.**
  - i. Two-Phase flow fundamentals through tees and orifices (pending RP-1444)
  - ii. Nanofluids in HVAC. (Ken Schultz and Petur to review for NM)
  - iii. Effect of Dust on Fouling of air side heat exchangers. (RTAR being prepared in 8.4)
  - iv. Low temperature heat transfer correlations for in-tube flow boiling of **CO<sub>2</sub>** and **NH<sub>3</sub>**... Fouling impact ? (Bruce Nelson RTAR)
  - v. Heat Transfer enhancement with micro encapsulated phase change materials.
  - vi. Heat transfer performance of new low GWP refrigerants. (TC 8.5 taking the lead, TC 1.3 cosponsor, 3.1 interest ?, 8.4 interest ? Samuel Yana Motor)
  - vii. Particle fouling for in-tube flow of CO<sub>2</sub> (M. Ohadi).

- viii. Heat Transfer and Pressure Drop correlations of refrigerant mixtures in low-temperature applications (M. Ohadi). TC 10.4 had RTAR together... TC 1.3 voted e-ballot.
- ix. The effects of fouling on airside droplet condensation in heat exchangers (Eric Rats).

**10. New business** (B. Korenic)

- a. New strategic plan
  - i. ASHRAE wants members to read and comment on new strategic plan.
  - ii. 11 topics, 1.3 listed with “improve specific components”.
- b. Amir Jokar won the ASHRAE new investigator award.

**11. Announcements from TC Chairs’ Breakfast Meeting** (B. Korenic)

- a. Victor Penar is TAC liaison.
  - i. The Hightower Award was given to a member of TC 1.1.
  - ii. Research Strategic plan for 2010-2015.
  - iii. Website: agenda and last minutes should be on the website.
  - iv. ASHRAE google groups for TC/TRGs.
  - v. Mike Bolchek (TC 1.1) volunteered to help get us up to speed.
    - 1. [TC0101@ashrae.net](mailto:TC0101@ashrae.net)
  - vi. Vegas theme is “Zero Energy Design”
  - vii. Montreal them is “Net Zero Buildings”

**12. Adjourn. 2:36.**

- a. **Kauffman motioned to adjourn. Branko seconded.**
- b. **Motion passed by vote of eleven for, none against, none abstained (11-0-0).**

**AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS,  
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**1791 Tullie Circle, N.E./Atlanta, GA 30329  
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**TC/TG/TRG MINUTES COVER SHEET**

**(Minutes of all TC/TG/TRG Meetings are to be distributed to all persons listed below within 60 days following the meeting.)**

TC/TG/TRG NO TC 1.3 (page 1 of 3) DATE May 26, 2010

TC/TG/TRG TITLE Heat Transfer and Fluid Flow

DATE OF MEETING January 26, 2010 LOCATION Orlando, Florida

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Branko Korenic	2008	Samuel Yana-Motta	2008	Andreas Beulter
John Thome	2008	Zahid Ayub	2006	Gary Price
Axel Kriegsmann	2009			Steve Eckels
Amir Jokar	2008			Kevin Dunshee
Lorenzo Cremaschi	2009			Satheesh Kulankara
Rick Couvillian	2008			Mustafa Yanik
Bruce Nelson	2006			Karine Brand
Joe Huber	2007			M. Sultan Khan
Jon Hartfield	2006			Yongfang Zhong
Justin Kauffman	2009			Omar V. Felicio

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Michael Ohadi	2006			Tony Jacoby
				Michael F.
				Meyer JP
				Ken Schultz
				Algirdas Bielskos
				Evraam Gorgy
				Ebrahim Al-Hajri
				Omar Somasundaram
				Stanislav Perencevic
				S.A.Sherif

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				K. Kontomaris
				Jeb Schreiber

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